COAL AGE

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What War Will Demand of the Coal Industry

COAL, coke and oil are the heart of the Nation's life. These fuels are even more important in the face of the additional heavy requirements of the railroads and the many new ships. Coal tonnage for naval vessels is twice as great under the stress of actual war.

We must produce more coal and coke in 1917, and we will have to do it with fewer men. We have 51 per cent. of the coal reserves of the world, and we are mining nearly 50 per cent. of the world's total output—but that's not enough.

Great Britain is short 15,000,000 tons; France lacks even more. In other continental countries restrictions are in force permitting the heating of public halls but once a week. No place can be heated for amusement purposes. Restaurants can only be heated from 9 a.m. to 9 p.m., and saloons not at all. Individuals must have a card from the Government to secure even a small allotment of coal.

We may not experience such conditions in this country next winter, but the way to prevent trouble is to prepare now. Foreign nations will look to us for help. Our domestic and industrial requirements will be greater.

What shall we do?

FIRST—We must increase efficiency through a centralized control, or "fuel board." Such a commission should be made up of competent and representative mining men. This board should have power to eliminate absenteeism in mines. The British estimate that absenteeism in their mines is 9.9 per cent., of which 5 per cent. is due to inexcusable indifference.

SECOND—There must be close coöperation between the railroads and the mine operators, so as to cut corners, lessen the unnecessary movement of cars and prevent congestion in certain localities. This will require a redistricting of the country to shorten hauls. Consumers must secure coal from the mines nearby and not get it from distant fields when there is an abundance close at hand.

THIRD—It will be the patriotic duty of manufacturers and all citizens to accept, if need be, grades of coal they have not been accustomed to use. This means an immediate educational campaign.

FOURTH—If radical measures are found necessary, mine labor and shipping facilities will have to be concentrated at certain points, even at the expense of other districts. The delays in loading railroad cars at wagon mines must be investigated.

The mines must work full blast this summer, and everyone should be encouraged to lay in full supplies of fuel before cold weather starts. The needs of the nation should be paramount, and mine owners in selling coal should refuse to take advantage of present national stress.

Please send your definite, concrete suggestions concerning these and other important measures of coöperation to the editor of *Coal Age*. We will see that they get to the proper authorities.

Ideas and Suggestions

Efficient Sand Dryer

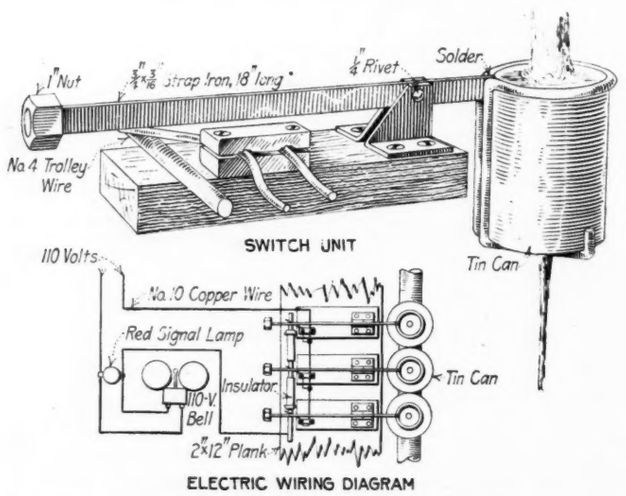
An efficient sand dryer can be made in the following manner: Secure a small Burnside heating stove to serve as a furnace, and set this on a good concrete or sheet-iron floor; make a hoop from a piece of ⅜ x 1-in. iron bent to rest on the four corners of the first section, or ash pit, of the stove; take a large metal washtub, cut out the center of the bottom so that the tub will fit neatly around the second section of the stove and rest on the hoop previously fitted to the first section; in the remaining bottom surface of the tub punch 1-in. holes about ½ in. apart, to allow the sand to run out when dry; cut a small notch in the top of the tub directly in front of the firedoor to allow this door to swing open.

This method of drying sand for two or three locomotives will be found far superior to drying it on a piece of sheet iron over an open fire.

At one of the Superior Thacker Coal Co.'s plants (Williamson, W. Va.), a dryer of this type was installed in the blacksmith shop. In this instance the blacksmith easily dried sand for two locomotives in addition to his regular duties. This dispensed with the services of one man, who had been employed to dry sand on a piece of sheet iron over an open fire.

Cooling-Water Alarm for Transformers

The three main transformers of a mine in Nevada were cooled by water supplied by neighboring springs. As there were frequent breaks in the connecting water line,



SWITCH UNIT AND WIRING DIAGRAM FOR COOLING-WATER ALARM

the danger of burning out transformers (which were fully loaded) became too frequent for comfort. To indicate water shortage at any one of the three transformers, the device illustrated was designed. It is extremely simple, consisting of an ordinary lever with a can having a small hole in the bottom at one end and suitable counterweight at the other. When the water from the transformer is running, it will fill the can and thus lower the lever on its end. The size of the hole in the bottom of the can is such that the water runs out slower than it runs in, thus causing the can to overflow. When the water stops flowing, the can will drain itself, and the weights are so arranged that the end opposite the can will lower and make an electrical contact. This is connected to a red signal light and 110-volt bell. A transformer cooling-water alarm is essential where the transformers are heavily loaded or in hot climates, for they will burn out in a short time if cooling ceases.—A. C. Daman in the *Engineering and Mining Journal.*

Seek Opportunity

By N. H. Seaburg*

"If I only had the chance to show what I can do!" is an exclamation that has passed the lips of everyone at one time or another. Discouraged by the success of individuals who possess less ability than ourselves, we have reached the forlorn conclusion that opportunity, or chance, or luck is what really counts, and not ability.

Lester F. Ward, after a careful study of the subject, states that native ability is quite common and evenly distributed, but not so with opportunity. In his generalization he figures that but 10 per cent. of society's mines of ability is fully developed; that another 10 per cent. is partly developed; and that the remaining 80 per cent. is practically untouched.

To utilize this vast amount of untapped ability it is necessary to broaden opportunity. What free opportunity exists is confined chiefly to the sons of those who are in comfortable circumstances, those whose fathers are in touch with the most promising openings in the business world and in the professions. These youths are generally far better educated and physically nourished, and the advantage is all in their favor. Contrary to the general delusion—which is hypocritical with most of us—the ability to pull strings with men who have the dispensing of promising openings is an asset which offsets just a trifle the possession of considerable native ability.

In the face of such an unequal distribution of opportunity, there is only one way in which a boy or a man with more than the ordinary amount of ability, or even with just ordinary ability, can rise above the average, and that is to go after opportunity with grim determination. Most of us wait for opportunity to knock at our doors, but therein we err. Dame Opportunity may knock, and then she may not. The surest way to make her acquaintance is to seek her out while others sit by the wall and await her coming. She is as fickle as the belle of any dance.

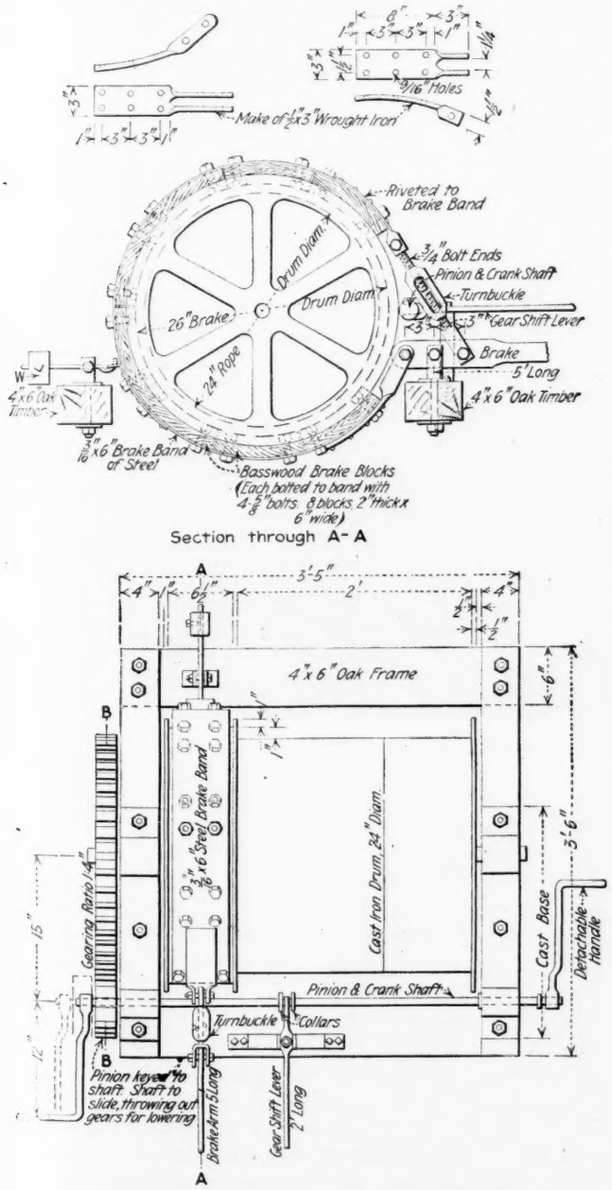
The man who will continually and confidently present his ability for sale wherever he thinks there is a market for it, instead of keeping it on the shelf gathering dust

*Boston, Mass.

until some purchaser expresses a desire to see it, is the man who will struggle out of adversity, even though he is equipped with just ordinary ability and no "pull." Waiting for a chance is a rust-gathering period. Occupy that time by seeking a chance, and, although you may not find it for some time, you will at least keep the cobwebs from forming on your mental machinery, thus enabling it to run smoothly and efficiently when the opportunity has been found.

Small Gravity Drums

On the Mesabi Range, timber, lagging, mine cars, powder and other supplies are commonly sent into the mine through "timber shafts," instead of through the main hoisting shaft, there sometimes being five or six timber shafts to serve a single mine.



DETAILS OF SHAFT TIMBER-WINCH

The material lowered through this timber shaft is ordinarily handled by means of a common windlass with brake attachment. In 1914-15, with the common windlass we had a number of accidents at our mines due to handling too heavy loads, it being impossible for the lander to hold the load, after raising it clear of the shaft collar, with one hand, while applying the brake with the other. It was therefore decided to install a winch for raising the load above the shaft collar. We could not find on the market a winch designed primarily for lowering, with means provided for readily disengaging the gears, and the winch shown in the accompanying sketch was therefore designed. Three winches of this type were built and installed in April, 1915.

In operation, the lander throws in the gear by means of the shift lever and hoists the load clear of the shaft collar. The brake is then applied, the pinion thrown out of gear, and the load lowered on the brake. Two ropes, wound on the drum in opposite directions, are used, so that the loaded end brings up the empty chain and there is always a chain ready to which to attach a load at the surface.—C. F. Jackson in the *Engineering and Mining Journal*.

Hanging Brattice Cloth in Gaseous Places

By Joseph Meakin*

My duties require me to remove the gas from a pair of entries that are crossing a steep hill and consequently are liberating a dangerous quantity of gas. As all work had to be suspended on the return airway until the entries were cleared, this proved to be slow work when performed in the usual way—that is, by setting up posts and curtains. Had it been necessary to erect the curtains only once, the trouble might have been endured; but inevitably the rush of air swept them away every evening when the shots were fired. As a result the output was reduced considerably.

It seemed to me that the posting of the entry was wasted energy, so the bratticeman and I contrived a better way. We got an old brace and bit and drilled holes in the roof 5 ft. apart, such as we had seen used by engineers for putting in stations. We put plugs in the holes, drove 20-penny nails in the plugs and turned the heads of these over with a hammer till the free ends of the nails were level. We suspended the curtain from these nails by simply hooking the heads through small holes made in the brattice cloth. The curtain was kept normally on the floor of the mine. When I visited the place on my rounds, I would drag the curtain from the side of the road, and in 10 min. have it hung on the hooks and the air driving out what gas had accumulated.

Before going to the surface to make a report, I would visit the entries again, and invariably I found them safe. As a result of this plan no time is ever lost in the section by reason of gas.

An Interstate Commercial Transaction—A contract for sale of coal f.o.b. mines, but for delivery in another state, constitutes interstate commerce within the Federal regulations of such commerce. (United States Supreme Court, Pennsylvania Railroad Co. vs. Sonman Shaft Coal Co., 37 Supreme Court Reporter, 46.)

*Fireboss, Chicago-Carlisle Coal Co., Carlisle, Ind.

Longwall Mining at Steubenville, Ohio

By Wilbur G. Burroughs*

SYNOPSIS—The original method of mining was room-and-pillar. This was abandoned, and the operation is now worked longwall. Systematic timbering at the working face is carefully followed and packwalls are scientifically built.

At the coal mine of the La Belle Iron Works, Steubenville, Jefferson County, Ohio, mining by the system of longwall advancing has been successfully carried on since June, 1913, at which time this method was put into operation. Previous to that time the room-and-pillar system had been used, the workings extending from Ohio under the Ohio River into Brooke County, West Virginia. At present in the longwall workings there are 2300 ft. of face and 47 roadways leading to the working face. Thus ample opportunity has been afforded to compare the two systems, both of which have been carried on in the same coal seam with all conditions influencing the mining of the coal remaining the same. The longwall advancing system is preferred.

Points in favor of longwall advancing as carried on at this operation are that all the coal is mined on the first attack, none being left to support the roof as is the case with the room-and-pillar system. About one-third more coal may be hauled per gathering locomotive, than in room-and-pillar mining, all other things being equal. The men are all together, so that one faceboss can oversee a larger number. Longwall mining always gives a good supply of fresh air for the miners at the face. Less pipe is needed in draining longwall workings since the water can be conducted to one central point from which it can be pumped out.

The coal mined is the Lower Freeport bed of the Allegheny Series, Pennsylvania System. A section through the coal and adjacent strata is as follows: Shale, 17 ft.; coal, 2 ft. 9 in.; shale binder, 2 in.; coal, 7 in.; hard fireclay, 5 ft. The shale overlying the coal forms a good firm roof; the fireclay a hard floor.

The coal bed dips toward the southeast 0.55 ft. in 100 ft. The face cleats strike N 21 deg. 30 min. E; butt cleats strike N 68 deg. 30 min. W. Thus it is seen that the conditions are favorable to longwall advancing—namely, a thin coal bed, flat rather than pitching; good roof and hard floor. The fireclay, however, when wet will heave in the room-and-pillar system when ribs are being drawn. It will heave in longwall if the packwalls are not placed correctly, but if the packwalls are correct, as described later on, no trouble is experienced from this source.

An average analysis of the Lower Freeport coal at this mine is as follows: Moisture and volatile matter, 31.06 per cent.; fixed carbon, 62.26 per cent.; ash, 6.68 per cent. The sulphur content is about 1.36 per cent.

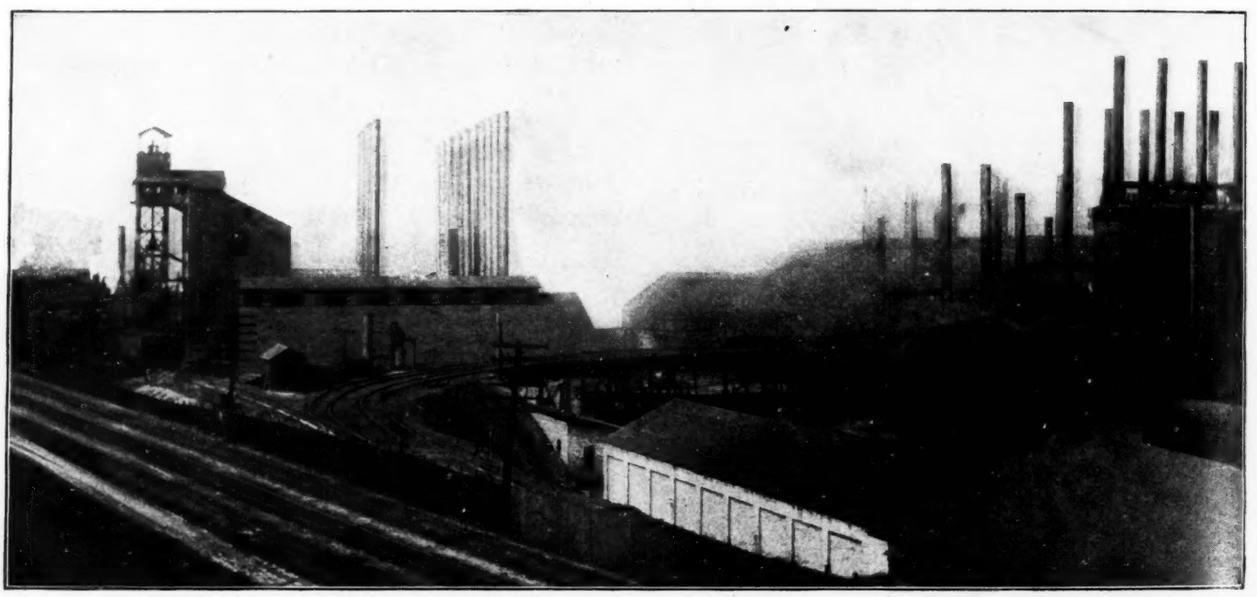


FIG. 1. GENERAL VIEW OF THE LA BELLE IRON WORKS

The coal is reached by a hoisting shaft 200 ft. deep, lined with brick and concrete for about 50 ft., after which it penetrates solid rock. It is divided into three compartments each 4 ft. 11 in. by 8 ft. 5 in.; two compartments are used for hoisting, while the third contains pipes and electric cables.

The coal mined by the system of longwall employed is entirely extracted on the first attack, the roof sinking upon the packwalls built to support it and to keep the roadways open. All roadways are 9 ft. wide and 7 ft. high. A main haulage motor road extends through the property, as may be seen in Fig. 2, which shows the method employed but does not include the entire workings. Parallel to this road a second road is kept open for use as a siding for cars of the main road. About every 800 ft. branch motor roads are turned off the main motor road in such a way as to follow the center of each machine section. Also from the main motor road, roadways

*11 Wiley Ave., Chautauqua, N. Y.

are turned at 42-ft. centers. These are extended parallel to the branch motor roads, as shown in lower portion of Fig. 3. From the branch motor roads "slant roads" are turned every 200 ft., or at such intervals as will best suit local conditions. The slant roads cutting across the roadways offer a more direct haulage from the face to the branch motor roads, and also allow that portion of the roadway thus rendered useless to be abandoned.

Cribs are erected where permanent roads meet, to strengthen the corners, as shown in Fig. 7. Old railroad ties or partly decayed timber are used, since old wood is springy and yields to pressure, allowing the roof to settle easily, whereas fresh, new timber resists compression and produces a shear in the roof that causes falls of slate.

In mining the coal at the longwall face three Jeffrey and one Sullivan electrically operated longwall mining machines are used; Figs. 5 and 6 show the Jeffrey machines in action in this mine. The coal formerly was undercut above the 2-in. shale binder, but at present it is cut beneath this binder in the 7-in. coal. The pressure exerted upon the coal by the roof brings the coal down without shooting.

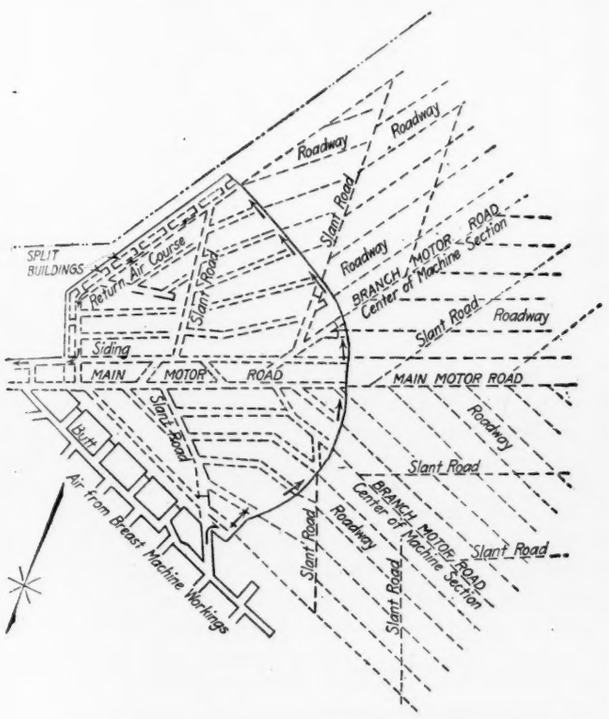


FIG. 2. PROJECTION OF LA BELLE WORKINGS

As the longwall mining machine proceeds in cutting the coal, a helper sets a prop about 4 in. in diameter, with a cap every 9 ft., this interval being selected so as to allow ample space between the props for loading the coal. The cap on top of the prop is from 2 to 3 in. thick, 4 to 6 in. wide and 12 to 18 in. long, the long axis being set at right angles to the fissures in the roof.

The mining machine having undercut the coal in its working place, and the coal having been mined, the machine again begins to undercut the coal across the face. One row of props, 9 ft. apart, is now extending across the working place. A timberman precedes the mining machine to make sure that the roof is safe and also to set a prop halfway between each of the props already set. This makes the props in the row 4½ ft. apart. At the same time the helper is again following the mining machine, setting props 9 ft. apart. This process is continued.

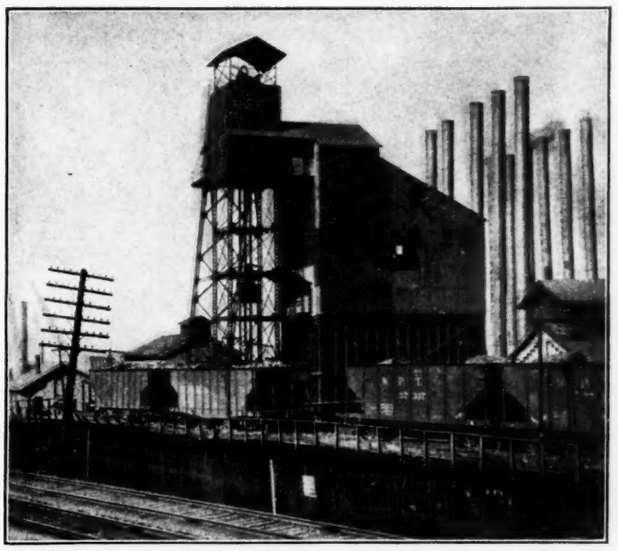


FIG. 3. TIPPLE AT LA BELLE IRON WORKS COAL MINE

The packwall is built forward as the coal is mined out. It is composed of rock partings and similar débris from the coal seam, and material secured by brushing the roadways, which is done every second cut of the mining machine. In this brushing a Jeffrey drill, shown in Fig. 4, is used to drill the holes, 33 per cent. dynamite being used, fired with a cap and fuse.

Some of the props are left to steady the roof as it settles upon the packwall. However, no props are allowed to remain within 3½ ft. of the side walls, for the weight of the roof on props thus left would bend and break them, throwing the packwall out of alignment.

The packwall is 12 ft. wide. The facewall is built every time the place is brushed—that is, approximately every 7 ft. The sidewalls are built true to line, as indicated by chalk marks drawn by the fireboss or mine foreman. The space between facewalls is entirely filled with broken rock and débris. No backwalls are built, the object being to protect the roadways by offering less resistance to settlement of the roof in the goaf, or open space between the packwalls, than at the roadways (see Fig. 7). Furthermore, if a backwall were built and the floor started to heave, the floor would come up in the roadway just as

FIG. 4. JEFFREY MINE DRILL IN OPERATION

FIG. 5. FRONT VIEW OF LONGWALL MACHINE IN OPERATION

readily as it would in the goaf. But by omitting the backwalls, the pressure, whether originating from the floor or roof, is relieved in the goaf, and the roadway remains open and unharmed.

Between the side of the mine or barrier pillar and the roadway (see Fig. 7) is a packwall. If this packwall is built solidly against the pillar, when the roof settles the roadway offers the only place where the pressure can be relieved, and the packwall is accordingly pressed outward and is apt to obstruct the roadway. To prevent this, an open space *b*, Fig. 7, is left between the packwall and the side of the mine or barrier pillar, so that when the roof settles the shear line follows the rib instead of the roadway, the pressure upon the packwall is relieved on both sides, the packwall is not pressed out into the roadway, and falls along the roadway do not occur.

Furthermore, the open space *b*, Fig. 7, between the side of the mine or barrier pillar and the packwall aids in securing good ventilation for all portions of the workings, since from space *b* an open passage, or split, *c*, 3 ft. wide, is constructed through the packwall at such intervals as are necessary for proper ventilation. Without these open spaces *b* and *c* gas might accumulate at *d*, where the air current would penetrate to only a slight extent. However, with open spaces *b* and *c* thorough ventilation is obtained.

All haulage in the mine is performed by electric power. Three 6-ton and one 8-ton Jeffrey electric mine locomo-

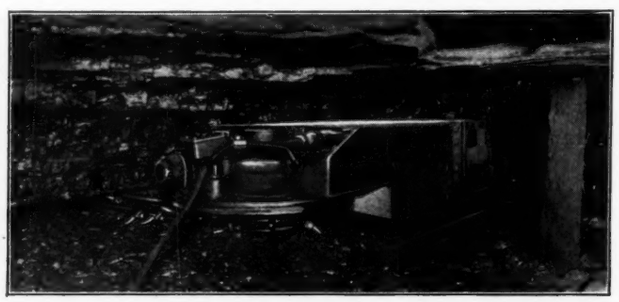


FIG. 6. REAR VIEW OF LONGWALL MACHINE

tives haul the trips, while a 3½-ton Jeffrey machine gathers from the face. The heaviest grade is 2 per cent.; the usual grade encountered is about ½ per cent.

Ventilation is accomplished with a 16-ft. Robinson reversible fan, operated exhausting and housed in a brick building. The fan shaft, 15 ft. 6 in. by 7 ft. 6 in. in inside dimensions, is about ½ mile south of the hoisting shaft. About 1000 ft. south of the fan shaft is an intake air shaft, 16 ft. 6 in. by 7 ft. 6 in. in inside dimensions. On the West Virginia side of the Ohio River is another air shaft.

The mine does not generate much gas, but nevertheless every precaution is taken to insure against accident. Firebosses make a thorough inspection each morning before the men are allowed to enter.

At the hoisting shaft the coal is brought to the surface on a self-dumping cage, by a Vulcan steam hoist. If desired, the lump is sent through one or both of two crushers. The coal produced in this mine is used in the furnaces of the La Belle Iron Works, to which it is taken in steel hopper cars hauled by electric locomotives.

The planning and operation of the longwall mining is in charge of R. W. McCasland, superintendent of the La

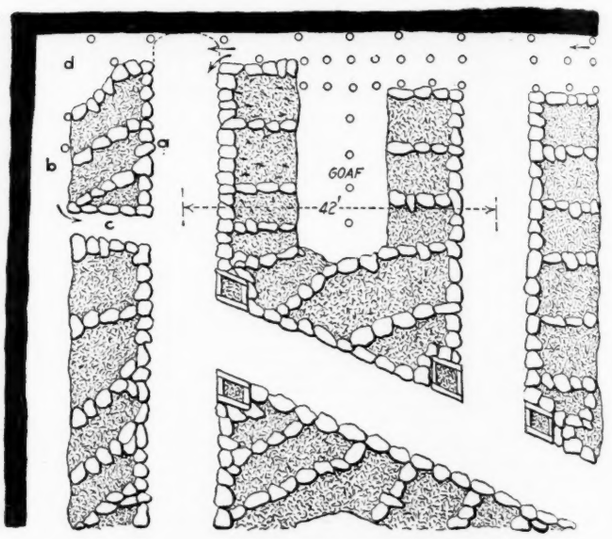


FIG. 7. PLAN OF WORKING FACE

Belle Iron Works mines, and to him and to Alexander Toward, assistant mine superintendent, I am indebted for information and other aid in the preparation of this article. I also wish to make acknowledgment of the courtesy of R. C. Kirk, president of the La Belle Iron Works, by whose permission the article was prepared; and to the Jeffrey Manufacturing Co., of Columbus, Ohio, for furnishing the photographs, which were taken in the interior of the La Belle mine.

COMING MEETINGS

Kentucky Mining Institute will hold its spring meeting May 18 and 19 at Lexington, Ky. Secretary, J. W. Read, Lexington, Ky.

Illinois Mining Institute will hold its next meeting on May 17, 18 and 19, at La Salle, Ill. Secretary, Martin Bolt, Springfield, Ill.

American Society for Testing Materials will hold its annual meeting June 26-30 at Atlantic City, N. J., with headquarters at Traymore Hotel.

International Railway Fuel Association will hold its annual meeting May 14-17 at the Hotel Sherman, Chicago, Ill. Secretary, J. G. Crawford, Chicago, Ill.

Canadian Retail Coal Association will hold its annual meeting at Toronto, Ont., Canada, June 14 and 15. Secretary, B. A. Caspell, Brantford, Ont., Canada.

American Society of Mechanical Engineers will hold its spring meeting May 21-24 at Cincinnati, Ohio. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

Mine Inspectors' Institute of the United States of America will hold its tenth annual meeting July 10-13 at Indianapolis, Ind. Secretary, J. W. Paul, Bureau of Mines, Pittsburgh, Penn.

Indiana Retail Coal Merchants' Association will hold its first annual convention at the Hotel Severin, Indianapolis, Ind., Wednesday and Thursday, Apr. 25 and 26. Secretary, R. R. Yeagley, Logansport, Ind.

Modern Compressor Equipment Paid

By Stephen W. Symons*

SYNOPSIS—One modern air compressor operating under favorable conditions, did the work formerly performed by nine old machines, seven of which were running under extremely unfavorable circumstances. The savings effected included not only fuel, but to an even greater extent, comparatively, the attendance and lubrication.

It would be difficult to find a more striking instance of the economies that can be effected by the substitution of modern equipment for old than that offered by the Pennsylvania Coal Co., at its No. 6 colliery near Pittston, Pennsylvania.

In this plant the Pennsylvania Coal Co. had a battery of seven straight-line, simple-engine-driven, three-stage air compressors for charging haulage locomotives. Each machine had air cylinders of 11½-in., 9-in. and 4½-in. in diameter, with a common 20-in. stroke. At a speed of 250 r.p.m., these machines had a piston displacement of 600 cu.ft. of free air per minute each, or a total piston displacement of 4200 cubic feet.

The air-haulage system having been discarded, the air from these compressors was turned into the main pipe line, supplying hoisting engines, drills, etc., its pressure being reduced to 100 lb. by means of a Foster reducing valve. Besides the high-pressure machines, there were two straight-line, single-stage compressors supplying air at 80 lb. to another portion of the mine. These machines had air cylinders 26¼ in. in diameter, steam cylinders 22 in. in diameter, with a stroke of 30 in., and a total piston displacement of about 2800 cu.ft. per minute, making the capacity of the entire plant, on the basis of piston displacement, 7000 cu.ft. per minute.

The three-stage machines had been installed some 10 or 12 years ago and, after the change from high- to low-pressure service, it did not take the operating company long to realize that the plant was decidedly inefficient and so costly in operation as to warrant installing more economical and up-to-date machines.

After the usual period of investigation, it was decided to install an Ingersoll-Rogler corliss-engine-driven compressor, with two-stage air cylinders of 29- and 18½-in. diameter respectively, and compound steam cylinders of 23- and 32-in. diameter, having a 24-in. stroke and a piston displacement of 2550 cu.ft. per minute, and discard the seven three-stage, straight-line machines. A new system of pipe lines, which eliminated restricted orifices, leakage, etc., was also installed, to take the place of both former systems.

After the new compressor was started up, it was found to be unnecessary to continue the operation of the two low-pressure machines, as the new compressor would take care of the entire mine. The effect on the steam consumption of the plant was extraordinary. No exact figures are available, but a fairly accurate estimate can be made of the consumption of the different machines, from which the total saving can be approximated.

*388 Henry St., Brooklyn, N. Y.

It is safe to say that the steam consumption of the seven three-stage machines, when operating at the high speeds mentioned, would total 44,000 lb. per hour; the loss in reducing the air to the working pressure of 100 lb. being considered. The two single-stage machines, when operating at their rated capacity, would require 504 i.hp., which, based on a steam consumption of 40 lb. per i.hp.-hr., would require the evaporation of 20,000 lb. of water, making a grand total of 64,000 lb. of steam per hour for the entire compressed-air plant.

The new compressor, which is operating noncondensing, has a steam consumption of about 21 lb. per i.hp.-hr. and, when developing its normal load of 400 hp., would require 8400 lb. of steam per hour. Assuming that 1 lb. of coal would evaporate 5 lb. of water, it would require 12,800 lb. of coal per hour to operate the old plant and only 1680 lb. per hour for the new, thus making a saving of 11,120 lb. of coal per hour.

On a basis of cost this would amount to 55.6 short tons per 10-hour day, or 16,680 tons per year of 300 working

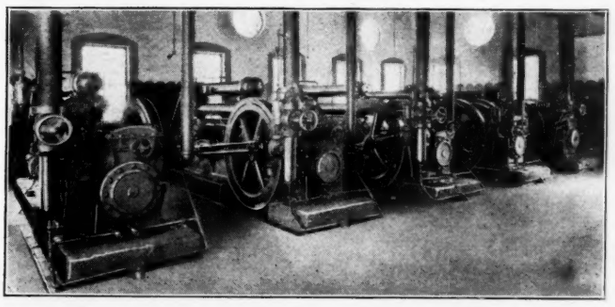


FIG. 1. CORNER OF OLD COMPRESSOR ROOM

days, which, with coal at 50c. per ton, would represent a saving of $8340 per year. At this rate, assuming that the compressor cost $15,000 installed, it would take but two years to pay off its entire first cost.

The saving in water was, of course, 64,000 — 8400 = 55,600 lb. Another remarkable saving, due largely to the refinements in the design of the new machine, was realized in the reduced consumption of lubricating oil, both for the cylinders and running gear. Both steam and air cylinders of the new machine are lubricated by force feed, this alone resulting in a reduction in the amount of oil required besides providing more perfect lubrication. Add to this the fact that, in the old plant, there were no less than 23 air cylinders and nine steam cylinders to feed, against two steam and two air cylinders in the new plant, and the saving is apparent.

More striking still is the reduction in the oil required by the running gear. The old machines were all of the twin-flywheel, outside-crank type, with the entire running gear lubricated by means of oil cups, while the new machine is of the wholly inclosed type, with the running gear lubricated by an automatic flood system, which only requires a small quantity of oil to be added every month to that already contained in the system.

A rough estimate of the saving in lubricant can be made as follows: Experience has shown that a 24-in.

stroke compressor with flood lubrication requires about 15 gal. of oil per month, added to that contained in the reservoir in the main frame or crank case, to make up for losses. This amounts to about 180 gal. per year of 300 working days and, with oil at 25c. per gallon, would represent a cost of $45 per year.

The seven 20-in. and two 30-in. stroke straight-line compressors with oil-cup lubrication would be provided with oil cups on the main bearings and eccentrics, for crank and crosshead pins, piston rods and guides at least twelve cups being provided for each machine, or 108 cups in all, having an average capacity of ¼ pint each. These cups would have to be filled on an average three times a day or, roughly 1 gal. of oil per machine per day, a total oil consumption of 9 gal. per day, or 2700 gal. per year of 300 working days, representing a cost of $675. The saving, to the credit of the new machine, would be $630, even more remarkable in its way than that realized on fuel and water. The greater cleanliness of the new machine is also marked.

The saving on attendance was equally noticeable, to say nothing of the saving in handling coal and ashes, maintenance and attendance on boilers, of which several where

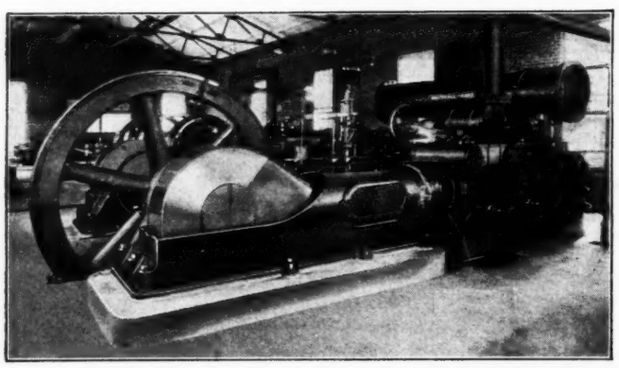


FIG. 2. NEW COMPRESSOR INSTALLED

shut down, saving on buildings due to the smaller floor space, etc. A statement of repair cost, of course, cannot as yet be given, but it will obviously be less for a single machine, new and of modern design, than for nine old machines that had about reached their limit of usefulness.

Of course, the credit for this remarkable performance is by no means entirely due to the higher efficiency of the new machine, but arises chiefly from the fact that the rated capacity of the old plant was more than twice as much as was actually required; and this in turn is accounted for, first by the method of basing these capacities on piston displacement, which is a misleading term, and secondly on the condition of the original pipe line, which was not properly designed and showed some leakage. The original plant was of such old design, and the machines were operating so much over speed, that while they were producing more than their rated capacity at norm[illegible] [illegible]es but little more than 50 per cent. [illegible]ent at the increased speed.

[illegible] design of pipe lines is one that has [illegible]d. There is no reason why a prop- [illegible] should show any appreciable leak- [illegible]d with due reference to the capacity [illegible]inal pressure required, the loss due [illegible] a negligible quantity.

There are many other plants, in the coal districts, where similar changes could be made with profit—plants where practically obsolete equipment has been nursed and coddled along by the mine operators for years, with the idea that, because fuel at the mine is cheap, they can afford to operate extravagant machines. But fuel cost is by no means the only cost; maintenance, depreciation, attendance, boilers, coal- and ash-handling, etc., all enter into the account.

Overcoming a Long-Standing Prejudice

The best means of overcoming the prejudice that exists in the minds of many practical men is to ask them a question the answer to which will illustrate the point in view. There is no man or class of men harder to convince than one who has learned by long and hard experience how things should be done, but has never realized that there is a shorter road to learning than the one he has traveled.

Some years ago I met a successful coal-mining official—a naturally bright Irishman whose early educational advantages had been limited. Being a man of good judgment, good habits, quick to grasp an idea and having a retentive memory, his years of experience in coal mining had made him one of the best practical mine officials I ever knew. His ability to do things properly and avoid danger increased his confidence in his power to overcome any difficulties that might present themselves in his daily work.

This man was a natural leader among men. It is doubtful if he ever read a book on mining, and one could easily believe that he had no use for a technical mining journal. He naturally thought that the best mining school was the mine, and he did not hesitate to condemn and ridicule the study of books pertaining to the theory and principles of coal mining. He had yet to learn that what he called "d——d theory" was the knowledge of how to do things—a knowledge that, in his case, had consumed years of wearisome labor to secure.

One day, somewhat against his will, he was forced to listen to a talk on the value of a sound mining education for all mine workers. The audience was composed of his own men who, as well as the speaker, knew his attitude toward book learning. Early in his address, the speaker turned to this man whose views he realized were a barrier that must be broken down, and addressed him thus:

"Mr. Dooley, you are known as an eminently practical and successful mine official, and I want to ask and have you answer one or two questions. Suppose for instance, that on going into a chamber pitching 60 deg., you found a miner setting a prop that was just long enough to reach from the bottom of the foothold in the floor to the roof, when set square with the pitch and with a cap on top of the post. Suppose he set that post square or at right angles to the roof and floor, what would you say to him?"

The reply came quickly; "Oi'd moighty soon till 'im to git a shtick a few inches longer and shtand it wid its head larning up the pitch and thin droive it and the cap-piece down the pitch till it wuz toight. Oi'd till 'im that a posht sit shquare on that pitch wud nivver hold, but wud shlip out whin it tuk the weight."

"Good, Mr. Dooley!" said the speaker, "I knew that would be your answer and want to say that you have stated

very clearly the theory of setting a post in a pitching seam. Now, pardon me if I ask you another question: Suppose, again on going into another chamber, you found a man tamping a good sized charge of powder in the face of a breast that was neither mined nor sidecut, but was solid from rib to rib. In other words, the shot had no 'loose end.' What would you tell that man?"

The response once more came quickly: "Oi'd d——d soon till 'im he wuz nary a miner at all. Oi'd make 'im undine his coal or shear a loose ind at one side, afore he shtarted to foire that shot. Oi'd infarm 'im that he'd be washting his toime, labor and powder and git nothin' in return but shmall coal, wid the chanct of causin' a blown-out shot that wud be dangerous."

Again, the speaker smilingly remarked, "Right you are, Mr. Dooley, you have explained clearly the theory of blasting coal in mines. It is not explained better in the books that I so often hear you say are of no use to the miner."

This broke the old man down completely and, rising from his chair, he addressed his men as follows:

"Min, Oi nivver undershtood what rale theory wuz, but Oi know now and Oi'm fur it. What Oi've larned be long years of worruk and be usin' the common sinse with which the good Lord blist me, Oi cud have larned quicker and aisier had Oi had the chanct. Min, ye have the chanct. Oi've always d——d the shtidy of books and theory, but Oi'm fur thim now and fur the radin' of minin' papers. Oi'm goin' to shubsheribe to a good minin' paper mesilf. Oi won't undershtand it all, but Oi'll git enuff out o' it to pay fur its price miny toimes over. Me advoice to ye lads is to shtidy and larn all ye kin from the books and the papers."

The old man's words produced a profound effect and did as much if not more good than the address of the speaker, because of its application to every man's need.

An Oklahoma Coal-Stripping Operation

By R. J. Howard*

The stripping operation to be described in the following paragraphs is at a mine that is owned and worked by the Alko-Nak Coal Mining Co., situated 1½ miles east of Henryetta, Okmulgee County, Oklahoma. The topography of this section of Oklahoma is somewhat rough, and the coal being worked lies between a chain of small hills. These hills separate the town of Henryetta from the mine.

The field represents the Carboniferous age, as do most of the coal fields in this part of the United States. The coal occurs in large, flat deposits that cover several acres and has a slight dip toward the southeast. However, over small areas the dip is hardly noticeable.

In this particular field the stripping is accomplished under rather favorable conditions, as no rock formations are encountered above the coal. The overburden is made up of a heavy clay and has an average depth of about 25 feet.

The coal is from 2 to 2½ ft. thick and has a 4½-in. clay parting in the middle. Because of this clay parting the coal is not loaded by shovel. In the present method of mining, the overburden is first removed by a large Bucyrus Model No. 225-B steam shovel that weighs over 300 tons. This shovel, which was installed in 1915, was put up and made ready for operation in 21 days. It has an 85-ft. boom and a 6-cu.yd. bucket, and handles an average of 5000 cu.yd. in a 9-hour day. The shovel makes two scoops a minute.

The rails on which the shovel operates weigh 100 lb. to the yard. The shovel is self-propelling, the driving mechanism being connected by chains to all four of the shovel trucks.

The coal is removed by hand shoveling. The top portion is loaded away first, after which the clay parting is taken out and thrown against the gob or disposed of otherwise, thus leaving the bottom half of the coal in a condition to be loaded. In this manner the company procures clean coal by removing the dirt before loading, as it would be exceedingly difficult, owing to the physical characteristics of the impurities, to clean the coal by picking it at the tipple.

After the overburden had been removed by the shovel, a trench was made through the coal wide enough to allow for the passage of cars and to afford sufficient room between car and coal for the men to work in. From this point on, the breaking of the coal was accomplished by wedges. Usually four men with sledge hammers are employed to break the coal along the bench made when excavating for the track. This bench is worked back against the side of the open pit until all the coal has been removed. No explosives are used except what is needed to open up the trench preparatory to laying the track for the coal cars.

The haulage is performed by a small dinky steam locomotive that conveys the coal from the workings to the tipple, usually in trips of eight cars with a capacity of 2 tons per car. The trip of loaded cars is sidetracked at the tipple, and the locomotive picks up the waiting empties and returns them to the workings. From the landing the loads are hoisted into the tipple by a small electrically driven hoist, and dumped.

The tipple is simple in design and admirably serves the purpose for which it was built. It is equipped with an alternating-current electric hoist. The shaking screen installed is capable of handling 1000 tons per day, grading the coal into two sizes. The shakers are driven by an alternating-current motor belted to the driveshaft. An automatic cradle dumps the cars as they are brought up one at a time from the bottom or landing track at the foot of the tipple.

The mine is drained by gravity into a sump located near the tipple. From this sump the water is lifted to the surface by an electrically driven centrifugal pump. The power for operating the machinery is furnished by the Henryetta Light and Power Co., being transformed at the mine for use in the motors.

The coal varies from soft to hard, the former finding a ready market as smelter coal while the latter is used mostly for steaming purposes. The coal does not outcrop at the surface, and it is therefore necessary that the shovel dig down to the coal, as was the case when the open cut was started. The shovel works with ease on a 10 per cent. grade. The material removed by the shovel is dumped into the space behind the face and coal-car track, as is customary in operations of this kind where the coal bed is flat or nearly so.

For aid in preparing this article and for some valuable information, the writer is indebted to J. L. McGinnis, assistant superintendent of the Alko-Nak Coal Mining Co.

*Wilburton, Okla.

War—and the Coal Industry

Under this heading in Coal Age each week we hope to publish items relating to war measures as they affect the coal-mining industry. We earnestly invite all our readers to send us interesting notes covering happenings which bear on the war, either in a military or an industrial way.—Editor.

Charles Rowland, who is superintendent of mines for the Upper Lehigh Coal Co., has started a class in military training among his men.

W. F. Woodward, who is president of the Pioneer Electric Mine Lamp Co., has been called to the colors as lieutenant in the naval service.

The Navy Department has issued an urgent request for bids on coal for delivery at various points as follows: Semi-bituminous, 57,000 tons; steaming, 1,097,500 tons; bituminous, 78,300 tons; semi-bituminous, 54,000 tons.

Among the proposed questions to be asked by the U. S. Geological Survey is one aimed to ascertain the general direction of coal movement from each mine. It is desirable to know the proportion which moves north, east, south and west. Also, whether the coal is for export, tidewater or lake destinations, domestic or industrial uses.

The creation of a war zone at Baltimore, stretching about 20 miles below the city, will make slow movement of coal boats, if enforced as now announced. Vessels will not be allowed to enter or leave the prescribed waters after sundown. A zone at the Capes and around Hampton Roads will cause further delays. Coastwise movement to and from this city is sure to be slower.

In one recent battle 250,000 18-lb. shells were fired. This means that 2250 tons of metal were shot through the air in a single engagement. It would take one man 416 years, working 10 hours a day, to make these shells, or 250 men would have to work 20 months on the same job. This shows how many machine shops we will need to have operating if our guns get into action. It is fortunate we have the asset of two years of skill acquired in making ammunition for the Allies.

The U. S. Geological Survey, as well as other agencies having knowledge of the facts, is urging all consumers of coal, both large and small, to store their winter's fuel during the summer months. If the general public can be convinced that deferring coal purchases until fall will certainly mean both the payment of higher prices and the incurring of considerable inconvenience, it is believed that a great service to the country will have been rendered. Store your coal now!

It may become necessary in the interest of the Nation to operate some mines at maximum capacity while others may be closed down. In this case it would be necessary to know the maximum number of men that could be used to advantage in each mine. Also, whether these men should be union or nonunion. These questions will therefore be asked by the Geological Survey, so that should it become necessary to increase the capacity of any mine or district this may be done with the proper operatives.

The large central power plant at Jenkins, Ky., together with the dam and lake above it, are being closely guarded. Some days ago suspicious characters were seen about the premises. One man believed to be a spy made the remark that the "whole machinery ought to be blown up." Immediately preceding the arrival of officers this man betook himself to the "tall timbers." This central plant supplies power to several large mining plants of the Consolidation Coal Co. and the Elkhorn Mining Corporation in the Boone's Fork and Beaver Creek fields. A large percentage of the output of these sections would be lost were the plant destroyed.

It would be well for the authorities in this country to consider well the British system of giving priority to war work and industries affiliated with such. The system adopted there divides all industries into various classes, in order of their importance in the production of war supplies. Thus industries in the first class not only get preference in the exemption of their men from military service, but also in obtaining the necessary supplies, such as coal. This is especially important to those firms engaged in the manufacture of products which have to pass through two or three different processes before reaching the final contractor who is making the finished product for the Government.

The coal piers of the Chesapeake & Ohio Ry. at Newport News, the Virginian Ry. at Sewalls Point and the Norfolk & Western at Lamberts Point, in addition to being under heavy guard have in some instances been fenced in. All persons having bona fide business on the properties are furnished with passes. All others are kept off. The guard duty is performed by detachments of the National Guard and the most careful watch is kept. The principal source of supply for the navy is Hampton Roads, and no chance is taken of any damage being done to the piers. There is usually considerable delay in loading coal for commercial accounts, but Government vessels are loaded promptly.

In view of the already rather acute shortage of anthracite coal, there is open anxiety expressed in many quarters as to what this may develop to under war conditions. Prices generally have already attained to unprecedented levels, the circular discount of Apr. 1 being more or less nominal, and the only solution in price, should this continue, seems to be Governmental regulation. In view of

the past efforts of the Government to reduce prices, some may not view this with much concern. On the other hand, the foreign governments did not put up long with these conditions when war was declared, and it is not unreasonable to expect that our Government will take equally drastic action when the occasion demands it.

The motor truck has come to play a large part in modern warfare. The United States Government now has about 2000 trucks, and six manufacturers can supply 100 trucks daily. Of the 2,451,660 miles of road in the United States 11.3 per cent. are suitable for the heavy traffic of motor trucks. It will also be a considerable problem for the Government to secure competent truck drivers, since men accustomed to truck driving on city streets often fail as drivers under war conditions. On the French front it requires 480 trucks to handle enough ammunition to feed the big guns for 2½ hours. With the Italian troops, 24 motor trucks are necessary to continuously supply ammunition for one big gun.

The Government has taken over five additional seagoing tugs, and this constant menace of further drastic action along these lines has brought negotiations in the coastwise trade to more or less of a complete standstill. It would be necessary for the authorities to take over only a few coastwise colliers to create a serious situation at Down East points. Already coastwise transportation is moving very cautiously, with the result that the usual number of trips are not being made and there is much speculation as to what will happen next. The movement of boats is no longer published, and it is difficult to get an accurate line on the market.

It is known that the Government is in close touch with some of the most important shippers in the coastwise business, and that large tonnages of bituminous coal may be commandeered at any time.

The Council of National Defense has organized a general Munitions Board, to take charge of supplying both this country and her allies with war material. It is hoped that all the industrial facilities necessary may be secured by the Government without resort to commandeering. In joining forces with the Allies, this country will be given the free exchange of facilities. Coaling stations of the United States will be opened to ships of the Allies, both merchantmen and men-of-war. In like manner, the navy and merchant marine of the United States may make use of allied coaling stations. This exchange of facilities will doubtless open great possibilities for American coal interests, and it is reasonable to expect that ere long some means for taking advantage of these will have been devised. The conference soon to take place between the State Department and foreign envoys is a preliminary step toward an economic coöperation in which coal is likely to play an important part.

In order to supply the Council of National Defense with information regarding the production of bituminous coal, all coal-mine operators are to be called upon by the U. S. Geological Survey to furnish estimates of the maximum daily capacity of their mines, the number of men actually employed and the number that could be advantageously utilized in mining. It is not the intention to secure exact information. Intelligent approximations will serve the purpose. Operators will be urged to furnish the best off-hand estimates possible without resort to the compilation of statistics.

This information is sought in an effort to meet an anticipated situation next fall. Unprecedented demands on the country's rolling stock, and a greater need for fuel than existed last fall, are in prospect, as well as greater difficulties in handling production. All agencies of the Government having jurisdiction are being concentrated in an effort to reduce the seriousness of next winter's coal shortage.

The Navy Department has issued the following memorandum to all contractors and railroad companies concerned with the supplying and transporting of navy fuel:

1. In connection with the effect of existing car shortage on the movement of coal to destinations for navy loading or consumption it recently became necessary to enforce that part of the Navy Act of Aug. 29, 1916, providing for the prompt delivery of Government materials; the provision in question being as follows:

> That in time of war or threatened war preference and precedence shall, upon demand of the President of the United States, be given over all other traffic for the transportation of troops and material of war, and carriers shall adopt every means within their control to facilitate and expedite the military traffic. And in time of peace shipments consigned to agents of the United States for its use shall be delivered by the carriers as promptly as possible and without regard to any embargo that may have been declared, and no such embargo shall apply to shipments so consigned.

2. Under the foregoing act it has been held to be mandatory upon the transportation company to supply the necessary equipment for the delivery of Government stores, but in order that there could be no question of the propriety of such action, especially in so far as relates to the obligations between railroad and shipper of commercial freight, an opinion was solicited from the Interstate Commerce Commission as to the duty imposed upon the railroads under the act referred to. The reply of the commission in so far as relates to this subject is as follows:

> . . . In reply I beg to state that the commission fully recognizes the law to which you refer as imposing upon the carriers the duty of promptly moving the property of the Government without regard to embargoes. Under that law, in the view of the commission, carriers have a perfect right to provide preferentially cars for Government shipments of coal. But all cars so provided must be counted day by day by the carriers against the distributive share of the mine to which they are given, and if on any day the number of cars so assigned exceeds the allotment to which that mine would be entitled under the percentage arrangement it should not be given any additional cars; and on other days it should be given additional cars only sufficient to make up the total of its ratable percentage for the day. . . .

3. In order that the railroads may have full knowledge of the equipment required to move navy fuel, it is suggested that coal suppliers, immediately upon the receipt of orders for coal, furnish the railroads with specific advice of the cars necessary to transport such tonnages; also that the railroads be kept informed of all equipment carrying navy fuel in order that such cars may receive expeditious delivery at destination.

4. Arrangements will be made whereby the transportation company may receive a copy of the order to the coal supplier if such information is desired.

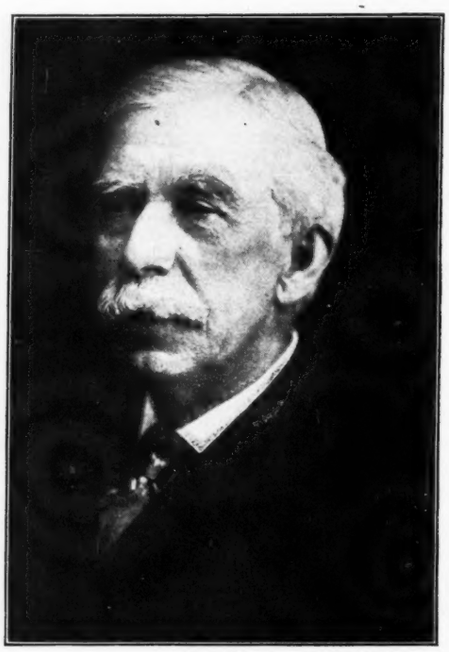
(Signed) SAMUEL MCGOWAN.

George W. Schluederberg

George W. Schluederberg was born in Philadelphia, Penn., on Feb. 25, 1843. Shortly afterward he was brought to Allegheny City by his parents over the old Pennsylvania Canal, during which trip a friend, while assisting his mother from one of the upper decks of the boat, accidentally dropped him overboard into the canal, thereby causing much excitement.

Mr. Schluederberg's parents bought a property near Madison Avenue, in Allegheny, and at six he started to attend the old Third Ward School, under a lady teacher by the name of Irwin. Later on he attended a private school conducted by D. Scheib. At the age of eight he started work at a tobacco shop, stripping tobacco for cigar makers.

At the age of 12 he was confirmed in the German Evangelical Church under Carl Weitershausen. This occurred on Oct. 8, 1855, and marked the completion of



GEORGE W. SCHLUEDERBERG

his school days. Immediately thereafter he commenced his apprenticeship of four years and learned a trade. After three years and nine months he was released from this apprenticeship as a full-fledged journeyman, being then slightly under 16 years of age.

For several years he worked with different firms in the neighborhood, and later traveled through Philadelphia, Baltimore and Washington, working in those various cities at his trade. Later on he took a commercial course in the Iron City College, which then occupied part of the Jackson Building, at the corner of Penn Avenue and Sixth Street, Pittsburgh.

In 1866, while working for J. H. Demmler, Mr. Schluederberg took a small interest in the Pittsburgh National Coal and Coke Co., and on Jan. 9, 1867, accepted a position with the company as clerk in charge of all books and accounts. Shortly thereafter he was made secretary and treasurer of the company and placed in charge of its mine.

In 1873, together with four or five of his friends, he started the Oak Ridge Coal Co., operating a mine at Oakdale, Penn. It was, of course, severely hit by the panic of 1873, and passed through some strenuous times. On Apr. 30, 1874, he married Margaret B. Sutch. The Oak Ridge Coal Co. continued in business for a number of years, operating several retail yards in Pittsburgh and on the South Side.

In 1889 Mr. Schluederberg became associated with F. L. Robbins as treasurer of the Pittsburg, Fairport and Northwestern Dock Co. and was supervisor of a number of coal mines. This continued until 1899, when the Pittsburgh Coal Co. was formed, and Mr. Schluederberg was made general superintendent in charge of 105 mines. Shortly thereafter he was made general manager, which position he occupied until his death, Apr. 1, 1917. His wife, to whom he was much devoted, died on Dec. 26, 1907.

Mr. Schluederberg was a man of strong physique, wiry and active, and was seldom, if ever, sick. He was a strong believer in the doctrine of "hard work," and in fact all his life was in the habit of concentrating on the task before him and working long hours. He was, however, very fond of music, reading and traveling, and was an inveterate reader of history, being considered an authority on that subject. He traveled extensively throughout the American continent as well as in Europe, and in fact just a few months ago he made a trip to Honolulu. He was an accomplished linguist and somewhat of a musician, particularly in his earlier days.

On Jan. 9 a number of his business friends celebrated, with a luncheon in his honor at the Duquesne Club, the fiftieth anniversary of his entering the coal business.

Mr. Schluederberg was a man who through his exceptionally vigorous mentality and physique, maintained his youth and his interest in affairs up to the very last. He was particularly fond of young people, and was, by them, considered excellent company. Many of his vacations were spent in touring with his younger friends, and many of his long trips were taken with them. For him old age did not exist, and he was in all senses strictly in sympathy with the spirit of the times.

Mr. Schluederberg died as he had lived—in harness. Till the day of his death he continued to work at full speed. Even when taken down with pneumonia, he refused to acknowledge that he was sick and objected to the attention of a physician. He leaves one son, two brothers and two sisters, all residing in Pittsburgh.

He was a member and past president of the German Club, member of the Engineers' Society of Western Pennsylvania, of the Technischer Verein, the Art Society, Academy of Science and Art, Historical Society of Western Pennsylvania, and Solomon Lodge F. & A. M.

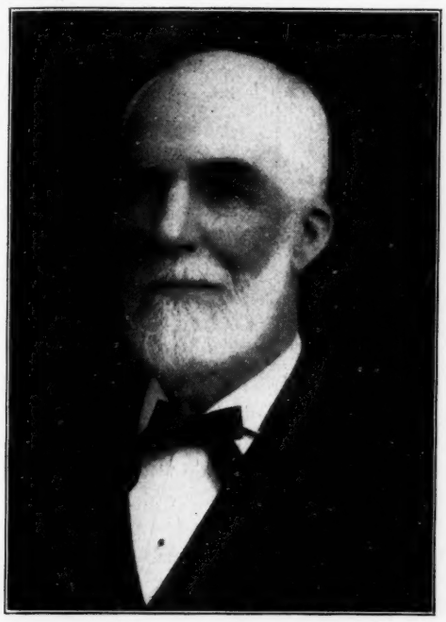
Joseph Milton Christy

Joseph Milton Christy, the inventor and manufacturer of the well-known Christy box-car loader, died at Excelsior Springs, Mo., after a long illness. His heart had long been seriously affected, but for a while it was thought that he would recover.

Mr. Christy was born in Youngstown, Ohio, Sept. 19, 1842. He was married on Jan. 1, 1867, in Moline, Ill., to Ellen Hemenway, of which union three boys and three girls were born, five of whom, with his wife, survive him, and all of whom were home to honor his fiftieth wedding anniversary which he celebrated last New Year's Day.

He was engaged in the cracker business at Rock Island, Ill., and Des Moines, Iowa, until 1891, when he sold out to the National Biscuit Co., and from the early 80's, for a period of 25 years, was interested in coal properties at What Cheer and Des Moines, Iowa.

It was not until 1900 that he invented the box-car loader with which his name will always be associated.



JOSEPH MILTON CHRISTY

He became president of the Christy Box Car Loader Co. and continued in that position to the day of his death. He was buried on Mar. 22 at Moline, Ill., a town he regarded as his home. Mr. Christy in a sense could so regard Covington, Ky., and Cincinnati, Ohio, for he had lived in both places. In the latter city he was for a while engaged in the dry-goods business.

The Best Way To Aid the President

By Howard H. Gross*

A fixed military policy which will protect the Nation and strengthen her manhood is the crying need of the hour. Each passing day demonstrates this. The Universal Military Training League and its sponsors believe that in universal military training lies the Nation's chief hope. They therefore urge two things:

First and foremost—Stand behind President Wilson in every way. He is bearing a tremendous burden. Assist him in all emergency measures whether financial, military or economic.

Second—Use every influence to impress upon our Senators and Representatives in Congress that emergency war measures now pending will not solve our military needs except temporarily. They may carry the country along for the present, but they will not do for the future. The most democratic program as a *fixed military policy for the United States* is that of universal compulsory military training. It treats all alike, makes use of young men before they reach the age where their earning capacity is high and when they are yet unmarried, and gives them six months' intensive military training. Then it sends them back to work. These trained youths will form the backbone of a great, democratic citizen army. This is the only definite, simple and patriotic plan that will make America safe and ready.

I earnestly hope that every American will stand by President Wilson and the Washington officials who, with the President, are bearing a gigantic responsibility. I have just returned from the National capital, and I know and sense in a measure the weight that is taxing our silent and conservative Chief Executive. It would be shameful to see his plans for meeting this crisis defeated. Therefore, as should all citizens, I bespeak general cooperation with President Wilson in these mighty works.

They are emergency measures, as he has said. This universal military training plan is supplementary to the President's emergency measures. It goes farther and will last longer. While he is doing all that he can do to pilot us through the eddies just ahead, I ask all patriotic citizens not only to strengthen his arm in this effort but to aid the Nation as a whole in supplementing the President's labors by the establishment of universal military and naval training.

The benefits resulting from such a democratic plan for raising an army in emergencies cannot be over-estimated. The last few weeks have shown how weak and futile other devices have been. The volunteer system is unfair and, because it is so, thousands of young men who are as patriotic and loyal as the best in the land will not offer their services. They have come to realize that the strong, highest types of manhood go forward while the cowards and slackers only too gladly stay at home. The best blood goes to the front while the unpatriotic rejoice in secret in the opportunity to remain safe and sound at home, pile up money and have a good time.

Such a false premium upon patriotism is not only disgraceful in a national military program, but it is decidedly uneconomical and wasteful. In nine cases out of ten the slackers are able-bodied and under proper tutelage would make good soldiers, while the patriotic fellows who rush to the colors are the sort who are needed most to steer the commercial and financial craft of the nation. The best brains will go into the ranks as privates and leave the sluggards at home to conduct the Nation's affairs. This is fundamentally undemocratic.

Selective conscription no doubt may be necessary at times, but it never will be popular. Universal military training, on the other hand, is through its very universality, plain, simple democracy. It says that all having the blessings of our institutions should, in time of need, contribute their aid to defending these institutions. It says, further, that the untrained soldier is so much cannon fodder and that the chances of the trained lad returning home in health from war are about three times greater than that of the untrained boy.

Therefore, in universal military training, the secret of our general military and naval needs for today, tomorrow and all time is found.

The Universal Military Training League makes special appeal to the people of the country to write their Congressmen to back President Wilson in all his emergency measures and to eradicate forever the doubt, uncertainty and weaknesses of our present muddled military policy by establishing in law a fixed plan for universal, compulsory military training and service.

Stand by your President and strengthen your Nation!

*President, Universal Military Training League.

Economics of Grade Revision for Underground Haulage

By R. D. Brown*

SYNOPSIS—Regardless of how carefully the mine haulage may be planned before the mine is opened, the development may encounter unforeseen inequalities in grade. The alteration of these is a question of engineering economics in the solution of which many factors must be considered.

Economic location of underground roadways means a location which will result in the production of a maximum tonnage with the minimum expense when the mine is operating to capacity. To attain this standard, it is presupposed that records of drillings and relative data have been used by the promoters of the enterprise in adopting the original working plan which at that time seemed most suitable to the known natural conditions. As development reveals the existence of irregularities, it becomes necessary to revise the original plans in order to obtain a practical solution of the problem.

In many mines the coal lies practically horizontal, and grading is unnecessary; in others, the construction of a permanent roadbed requires considerable expense for revision, due to the irregularity of the undulating bed. If development is carried out according to a practical definite plan, the main-line roads will be so constructed that the general grade, either with the loads or against them, will not be excessive. It must be remembered that the loaded cars all travel in one direction and that the capability of the motor to handle the load is a limiting factor.

Thus a ruling grade may be either with or against the loaded trip, depending on the capacity of the motor when pulling or the braking control when descending a grade. When the average grade is excessive, a locomotive depending on the adhesion of its tires for the development of tractive effort may not prove economical, and a rack-rail locomotive or a rope-haulage system should be installed.

All Elements are Correlated

When taking up the design of the separate elements effective in mine operation, we must bear in mind that all the elements are correlated and that there are definite limits to the output which control the development and extension of each. The size of the shaft and the depth of the hoist are good examples of governing conditions predetermined and restricting. It is plain that it would be mere folly to overdevelop the haulage system to produce a tonnage greater than that which could be cared for by the hoist.

After an analysis of existing conditions indicates that a saving is possible by improving a haulage road, an estimate must be made to determine the approximate amount which may be profitably spent in making the improvement. To simplify the proposition, the discussion will be made directly applicable to haulage with locomotives depending on adhesion of the tires to the rail for the tractive effort, and the estimated value of the improvement will be based on a separate investigation of each of the three classified advantages accruing.

*Harrisburg, Ill.

These advantages are: (1) A reduction in the general mining labor cost; (2) reduction of the power cost per ton hauled; (3) reduction of the general expense, including the saving made possible by the postponement, either temporary or permanent, of expenditures for additional equipment such as locomotives, electric generating units, engines and boilers.

Some one operating condition usually limits the mine capacity, and good management necessitates an adjustment of all other expenses to meet this condition. A certain amount of delay is unavoidable, and in order to keep one department which is being pushed to its maximum capacity in continuous operation, other departments may necessarily be carrying a greater labor expense than is actually required. If, therefore, the maximum capacity of the limiting department is increased, the others will approach more nearly their true efficiency. For example, if a main haulage motor pulls a certain number of extra cars per trip as a result of grade reduction, the total number of tons produced by the mine may be increased without a proportionate increase in the general labor cost.

To express this saving by a formula let

t = Tons produced per shift before increasing the tonnage;

T = Tons produced per shift after increasing the tonnage by pulling extra cars per trip;

c = Labor cost to produce t tons expressed in dollars;

C = Labor cost to produce T tons;

S = Saving per ton in dollars resulting from the increased tonnage.

Then

$$S = c \div t - C \div T$$

For example, a certain mine with one main-line haulage motor making 16 trips in eight hours from two partings produces 950 tons of coal per shift with the cost shown below.

Total bottom labor	$145.38
Total top labor	52.69
Total labor	$198.07

If the grade on one of the runs is reduced, the motor will easily pull 1000 tons. To accomplish this, the extra labor cost will be eight hours for one driver and one hour for a track layer per shift. The total labor cost would then be $201.45, and the total cost, including $1 per shift for feed, care and depreciation on the mule, would be $202.45. The saving per ton produced would be

$$S = 198.07 \div 950 - 202.45 \div 1000 = \$0.006$$

If a summit is lowered, the power required to overcome grade resistance is less; and by increasing the number of cars per trip less power is required per ton of coal hauled, as the proportionate ton mileage of the locomotive itself is reduced. The weight of the locomotive inbound may perhaps be one-third and outbound one-fifth the total weight of the trip. It is plainly evident that considerable energy is required to move the locomotive alone.

The cost of power may be further reduced by obtaining a high load factor. The maximum energy demand of

the motors on the grade will be the same, since we presuppose that the largest number of cars will be pulled at all times, depending on the grade, but the average power consumption of the motor will be increased at all other points on the trip, thus affecting the load factor for the entire mine.

The results of many observations show that a definite relation exists between the cost of production of electrical energy and the load factor. With a small plant of one unit, as usually installed at a coal mine, the cost of power at no load is excessive, being approximately one-third to one-half that of full load. On account of the terms of a contract with the miners' union the labor cost is usually a constant, and the only difference in the cost between no load or part load and full load is in the amount of coal and supplies used. The advantage of keeping the plant load uniformly near the rated capacity without high peaks is plainly evident, and in case the power is purchased from a central station, the saving may be considerable by obtaining a sliding scale contract providing for this feature.

In order to express the total value of the power saved by a formula let

n = The number of trips made by the locomotive per shift;

g = Gross weight of locomotive and trips, both loaded and empty, when the mine is producing t tons of coal;

G = Gross weight of locomotive and trips, if the mine produced T tons of coal through adding x cars to each trip;

$(T - t) = (G - g)n$ = increased tonnage hauled;

L = Net tonnage of locomotive alone for all trips;

E_T = The efficiency or percentage of power used in hauling cars when the mine produces T tons;

E_t = The efficiency when the mine produces t tons;

K = Cost of power per kilowatt-hour expressed in dollars;

R = Per cent. saved per kilowatt-hour due to reduction of load factor;

P_T = Power used to produce T tons;

P_t = Power used to produce t tons;

S_1 = Saving from increased efficiency of power resulting from a reduced ton mileage of the locomotive;

S_2 = Saving per ton from reduction of the load factor;

S_3 = Saving per ton due to lowered summits or of rise and fall, acceleration and braking power losses not being considered;

S_P = Total saving per ton of coal produced, in power cost resulting from an increased tonnage produced by reducing the limiting grade.

Then

$E_T = (nG - L)/Gn$ when producing T tons;

$E_t = (ng - L)/gn$ when producing t tons;

$S_1 = (E_t - E_T)KP_T/T$;

$S_2 = RKP_T/T$;

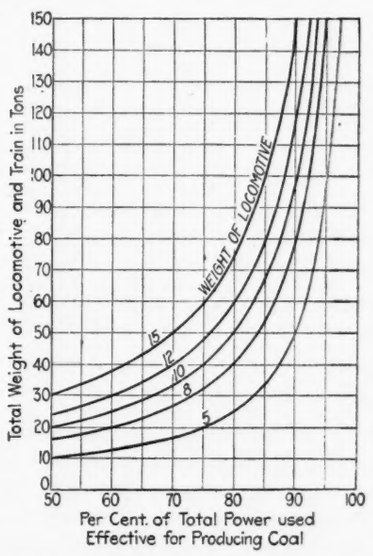
$S_3 = (P_t/t - P_T/T)K$;

$S_P = [(E_t - E_T) + R]KP_T/T - (P_t/t - P_T/T)K$.

It is possible that the maximum power requirement to operate on a ruling grade will call for power-producing equipment with a capacity rating out of proportion to the duties otherwise demanded. If this be true, the overhead charge of interest, taxes and depreciation on the necessary increased expenditure would be chargeable to the ruling grade. In other cases a reduction in grade resistance will render available power needed in the operation of other units, and the expenditure of funds for additional power is deferred. The amount of the interest on the deferred expenditure may be added to the other calculated savings to be expected from the proposed improvement.

A heavy pull exerted on a limiting grade will also tend to increase maintenance and repair charges for both rolling stock and track. If the grade is reduced, the car repair cost per day may increase, due to the greater number of cars hauled; but the charges per car-mile and the maintenance per ton hauled will remain the same and will not affect the unit cost per ton of coal produced.

By cutting down a hill or otherwise improving the haulage, the hazard of operation is greatly reduced. The danger to equipment has been discussed under maintenance and repair charges. The greater hazard, that to human life, although hardly directly calculable, is of vital



POWER EFFECTIVE IN HAULAGE

importance and must not be overlooked when considering the possibility of any proposed improvement. In other words, it is simply applied safety and could be included under the head of insurance.

Summing up all the previously discussed advantages resulting from the reduction of a ruling grade, that amount, expressed in cents per ton produced, multiplied by the number of tons available to be hauled over the improved section, will give the total sum that may be expended on the improvement. Let

y = The estimated number of tons available;

C = Cost of grade reduction, including interest on money invested;

S = Summation of all savings, expressed in cents per ton;

V = Value of safe operation.

Then $(yS + V)$ should be equal to or greater than the value of C.

If the value of yS (the total saving expressed in dollars), is less than the cost of the improvement, and the value of safe operation does not, in the opinion of the management, overcome the difference, then the project should be abandoned. As a matter of fact, the judgment of the promoter must be relied on throughout the entire investigation. False assumptions may be made in some cases, leading to erroneous conclusions, but by following out carefully each step indicated, it is possible to make a fairly accurate prediction of the results to be attained from a proposed grade reduction.

TABLE I. GIVING THE NUMBER OF KILOWATTS REQUIRED TO HAUL ONE TON GROSS TRAIN LOAD (AS MEASURED AT THE TROLLEY WIRE)

The total resistance includes the tractive resistance of 20 and 30 lb. per ton on level track and grade resistances up to 4 per cent., inclusive

	Velocity in Miles per Hour									
	4		5		6		8		10	
Per Cent. Grade	Tractive Resistance Lb. per Ton 20	30	Tractive Resistance Lb. per Ton 20	30	Tractive Resistance Lb. per Ton 20	30	Tractive Resistance Lb. per Ton 20	30	Tractive Resistance Lb. per Ton 20	30
0	0.2	0.3	0.25	0.38	0.3	0.45	0.4	0.6	0.50	0.75
0.5	0.3	0.4	0.38	0.50	0.45	0.60	0.6	0.8	0.75	1.00
1.0	0.4	0.5	0.50	0.63	0.60	0.75	0.8	1.0	1.00	1.25
1.5	0.5	0.6	0.63	0.75	0.75	0.90	1.0	1.2	1.25	1.50
2.0	0.6	0.7	0.75	0.88	0.90	1.05	1.2	1.4	1.50	1.75
2.5	0.7	0.8	0.88	1.00	1.05	1.20	1.4	1.6	1.75	2.00
3.0	0.8	0.9	1.00	1.13	1.20	1.35	1.6	1.8	2.00	2.25
3.5	0.9	1.0	1.13	1.25	1.35	1.50	1.8	2.0	2.25	2.50
4.0	1.0	1.1	1.25	1.38	1.50	1.65	2.0	2.2	2.5	2.75

Formula

Kw = (Tr. x v x 0.746) / (550 x 0.8);

Kw = Kilowatts used to haul one ton as measured at the trolley wire. (The losses in the line must be added to obtain the total power indicated at the switchboard.)

Tr = Tractive resistance in pounds per ton;

v = Velocity in feet per second.

Note—The efficiency of the motor and gearing are taken as 80 per cent. when running with the controller cut out. With the controller in circuit, the efficiency of the motor will be from 60 to 65 per cent.

TABLE II. AVERAGE COST PER KILOWATT PRODUCED FOR THE VARIOUS POWER-PLANT UNITS

Item	Minimum Cost per Kilowatt Capacity	Maximum Cost per Kilowatt
Boilers and settings	$10.75	$13.25
Stokers	1.30	2.20
Flues, dampers and regulators	.60	.90
Boiler-feed pumps	.40	.75
Feed-water heater	.26	.35
Piping, valves, etc	4.20	7.00
Economizers	1.30	2.25
Foundations for engines	2.00	3.00
Engines	22.00	30.00
Generators	16.60	22.80
Switchboards and wiring	3.20	4.20
Supervision	4.00	6.00
Miscellaneous	2.00	3.00
Total	$68.55	$95.70

The values given above may be used to approximate the interest and depreciation on a deferred expenditure for equipment made possible by reducing the limiting grades, thus lowering the maximum energy demands for short periods of time. The saving of interest and depreciation may be considered as a partial payment on the cost of the grade reduction proposed.

An Important Decision

A decision that may have an important bearing on suits brought in the New York State Supreme Court by miners injured while employed by mining companies in Pennsylvania or elsewhere, and who institute their suits for damages in this state, was handed down recently in the case of Brennan vs. Philadelphia & Reading Coal and Iron Co. The decision follows:

This is an application addressed to Special Term to dismiss the action as a matter of discretion. Plaintiff, a resident of the State of Pennsylvania, instituted this action for injuries sustained in Pennsylvania, against the defendant corporation organized under the laws of and having its property in that state. The action is based upon the Mining and Employers' Liability Act of Pennsylvania, and is brought in this state under the fourth subdivision of Sec. 1780 of the Code of Civil Procedure, which provides that an action against a foreign corporation may be maintained by a nonresident "where a foreign corporation is doing business within this state."

As a defense to the action the answer alleges among other things that while this court has the right to maintain jurisdiction and has the right to refuse it, it should not entertain the case. The Appellate Division of the Second Department in Waisikowski vs. Philadelphia & Reading Coal and Iron Co. (173 Appellate Division, 538) has held that the provisions of the code section stated are not to be construed as mandatory upon the court to maintain the action, but that it should exercise its discretion under the special circumstance of each case.

If ever that discretionary power should be exercised against a plaintiff it should be in this case. No reason whatever is assigned by him why he cannot get relief in the place where the accident happened and where all the parties and witnesses reside or why he seeks this forum for the institution of this action. Is it, forsooth, because he has heard of the substantial verdicts rendered in like cases in this state? Whatever the reason, it is well to hearken back to the pertinent language of Judge Gray in Pietrarovia vs. N. J. & N. H. R. R.R. & F. Co. (197 N. Y., 434), where he says: "As a question of policy it is intolerable that our courts should be impeded in their administration of justice and that the people of this state should be burdened with expense in redressing wrongs committed in another state, for the benefit solely of its citizens, and where the remedy is in the enforcement of its statutes."

Exercising this discretion vested in the court under the authority of the Waiskowski case cited, I will dismiss the complaint herein, upon condition that the defendant stipulates that in the event that the plaintiff begins action in the courts of Pennsylvania for the injuries in question within four months, it will not interpose the defense of the Statute of Limitations which is available to it under the laws of Pennsylvania. Submit order accordingly on notice.

By Burning 26 Lb. of Coal a Ton of Coal Can Be Dried so as to reduce a moisture content from 1.25 per cent. to 0.5 per cent. or even less. While 0.5 per cent. is a sufficiently low moisture content, it must be remembered that the air in which it is dried becomes saturated; and passing in part with the fuel to the storage bins it gives an opportunity to the coal to absorb part of the moisture that has been taken from it as soon as the fuel reaches a sufficiently low temperature. For this reason the storage bin should have ventilating shafts, and the high points of the conveying system should be connected with the outside air. Each shaft should be equipped with a ventilator of approved type, and proper provisions should be made to collect and deflect any condensation in the ventilating shafts, so as to prevent its return.—C. J. Gadd, Journal of the Franklin Institute, September, 1916.

FASTER!
THIS SUMMER THERE WILL PROBABLY BE AN EXTRA MOUTH TO KEEP FULL
— AND EVERY OTHER MOUTH WORKING OVERTIME —
MORE!
NAVY
ARMY
VIVID MEMORY OF LAST WINTER
THE RETAILER'S COAL POCKETS
IT'S THE HABITS OF THE WISE OLD SQUIRREL FOR US THIS SUMMER

"THE RETAIL COALMAN'S" GRAPHIC INTERPRETATION OF THE SITUATION

The Labor Situation

General Labor Review

The meeting in New York City to discuss the wage scale has resulted in the granting of an advance of 10c. per ton and a wage-rate increase of about 60c. a day; roughly speaking, a rise in wage of 20 per cent. to miners and other mine workers. Many of the operators resented the fact that they were compelled under durance to grant an increase in wages. such durance as was used came from the rank and file and not from the mine workers' leaders. The leaders have kept faith as far as they could. If the mine workers are met with charges of bad faith, they cannot excuse themselves by alleging bad leadership.

Because some of the operators resented the summons to meet in New York, there was some degree of acrimony manifested in the meetings, and time was wasted in discussing the events leading up to the calling of the session, in which debate P. H. Penna and Frank Farrington joined. But as J. P. White declared, the meeting was called, and it was not well for the persons present to waste time questioning why they were there. And after all, there was not a little feeling that while the mine workers were wrong to ask an increase, the operators would be wrong to deny it under the circumstances.

Harmony Between Mine Worker and Operator

The feeling between the parties—we dislike to term them the contending parties—was excellent. Both mine workers and operators regarded one another with more sympathy and respect than ever before. As for Mr. White, his earnest fight for the honor of the union as a pledge-keeping body, though only partly successful, has made him more respected than ever.

The operators of western Pennsylvania were in favor of the new scale not only as a measure of justice, but as a means of retaining their men, who have been showing a disposition to leave for the munition works.

The scale for the central competitive region being settled, it is certain that a readjustment will be sought and granted in central Pennsylvania. And it is to be hoped that the mine workers in that region will be actuated by reason. They have shown themselves somewhat lacking in that quality. They may reasonably expect an increase on the contract rates as large as that granted in western Pennsylvania, but, of course, in advancing the scale to accord with the increase in the central competitive district, the mine workers must renounce their interest in the bonus granted them on Jan. 1 of this year and the special advances made to outside employees. In fact, the central Pennsylvania men must remember that it was the action of the operators in that district in granting the 10 per cent. bonus that gave an impetus to the movement for increased wages.

The representatives of the central Pennsylvania operators and mine workers met at Philadelphia in the afternoon of Apr. 17, but adjourned early, awaiting the action of the conference.

Where New Scale Will Involve a New Price

It is expected also that the union and the anthracite operators will soon meet to discuss a new scale. There is a difficulty there that does not exist in the bituminous region. The anthracite operators have not raised prices except to cover the previous increase in wage. They are confronted with the necessity of securing a larger price from the general public, which, without sufficient reason, is somewhat soured against the anthracite producer.

On the other hand, the anthracite operator is freer than most others in one respect, as he has no long-time contracts and cleans his books of orders every month. The retailer will have to do the same. There is no question as to the quality of the patriotism of the anthracite producer. He is willing doubtless to grant the increase which is clearly demanded of him by the situation, but is the public as patriotic and reasonable?

Mr. White's remarks regarding bonuses are hardly fair. The man who receives a consideration beyond his contract should be pleased with it no matter how it comes and should not object if it is regarded as revocable when conditions change. Mr. White may with reason object to a permanent bonus arrangement, may take exception to the element of instability which it suggests, but so long as such changes are made by the operators of their own free will during the life of a contract there can be no valid objection to bonuses.

The arrangement as now made is excellent. The operators and mine workers have provided a definite wage increase per unit of time and labor, and not a percentage increase which will vary with the payments under previous scales. This will keep the districts when competing with each other just where they were. It will be said that this statement conflicts with that in the previous paragraph, for the bonus is a percentage increase. But the bonus is temporary and was not given during a time of fierce competitive strife. This increase is an adjustment which is likely to have a permanent bearing on the next contract. It is well that the increase is so much per ton or per day, and not so much per cent.

What Exemption of Deadwork and Yardage Means

Another good feature is the fact that no increase is given for dead work or yardage. The advances in these items are discriminatory in their action though not in their intent. They hamper those districts which pay dead work and yardage and tend to put them out of the market. But with these items kept unchanged, the agreement made will hurt no one, not even Illinois. In fact, it will help Illinois a little, for nowhere is better use made of day labor than in that state. Illinois uses less day labor per ton perhaps than any state in the Union.

It has been carefully protected in this agreement by the provision as to dead work and yardage, and the increases in the price of day labor have added to its security. Yet no one will be disposed to look jealously on the fact that Illinois has had this little triumph. Even the Illinois mine workers realize that the operators of the state need some consideration, this year at least, if not in years to come.

No One Likes Industrial Workers of the World

There will be no strike of the Industrial Workers of the World in the mines of upper Luzerne County this spring, for efforts of its organizers were frustrated by the activity of the county and municipal authorities. They prevented the organizers from holding meetings and so restricted their propaganda. The experience which Pittston and the nearby towns had in 1916 with the Industrial Workers was extremely costly. The strike called in August resulted in much violence, in the dynamiting of four homes, in brief suspensions at some collieries and in the reduction of the output of the mines in Pittston and its vicinity to 50 per cent. of normal during a six weeks' period. During the strike, it is estimated that close to 1000 mine workers left the Pittston district for permanent residence in other industrial centers. The munition plants secured most of them. The industry has not fully recovered from that exodus and there is a continuous shortage of labor.

When the agitators renewed their work in February, announcing a strike on Apr. 1, Sheriff Buss ordered owners of halls not to let their premises for I. W. W. gatherings. Mayor Donnelly of Pittston did likewise. It was too cold for outdoor meetings, and the few that were attempted were speedily broken up. The treatment was drastic, but it worked well. Unable to engineer a strike for Apr. 1, the date was shifted to Apr. 16, but the attempt to renew the work of organization was again blocked by the drastic action of the local authorities. The backbone of the I. W. W. in Luzerne County is practically broken.

I. W. W. Organization Is Grossly Unpatriotic

Placards announcing the strike made mention solely of the fact that $5 a day as a minimum wage was the aim of the organization. No reference was made to the war nor were other demands put forward. It is certain, however, that the I. W. W. has added to its unpopularity by its consistent lack of patriotism and its opposition to all war except that which it wages against the public.

In central Pennsylvania the Commercial Coal Mining Co. and the Big Bend Coal Mining Co., both of Expedit, between Vintondale and Nanty-Glo, Cambria County, have officially announced a bonus of 10 per cent. to date from Apr. 16. About 1000 mine workers are affected.

In Somerset County the Maple Ridge Coal Co. at Holsopple is still on strike looking for recognition of the union and all the union trimmings. The mine workers of the Rich Hill Coal Co. at Hastings, Cambria County, on Apr. 13 returned to work, thus ending a strike of two weeks' duration. This strike arose over an arbitrary order of the mine foreman, and he is to be discharged. In the idle interval a number of unmarried men have enlisted in the army.

The Pittsburgh district has been quite quiet, awaiting the results of the momentous conference in New York City. The State of Pennsylvania generally has been working more regularly, as the car supply in the first half of last week was nearly 100 per cent. of its needs. But the production fell off because of the Easter festivities. In the latter part of the week the car supply fell off badly. This week started with the Russian Easter, and the effect was marked wherever many Russians were to be found. The mine workers throughout the field are showing much patriotism, and flag raisings are the order of the day. At some of the mines these events are made matters of much ceremony.

Deficiency Differential in the Hocking Field

The C. Robbins Coal Co., near Nelsonville, Athens County, Ohio, which mines coal of varying thickness in the Hocking Valley district, has granted a contract to the miners' union embodying substantial concessions to the men, especially for the mining of low coal. Places with coal thinner than 3 ft. 4 in. are declared to be "deficient," and the company will pay $4.20 a day for the driving of them. It is expected that this contract will have a considerable effect on the prices paid by other operators in the Hocking Valley district.

Because a few kegs of powder lacked the union label, the Shiloh mine of the Southern Coal, Coke and Mining Co. at Belleville, St. Clair County, near East St. Louis, Ill., has been idle. The matter has been adjusted and the 400 miners have returned to work. The powder is the same that has been used for 20 years and the union labels were left off a few kegs by mistake.

Operators Start Lockout To End Illegal Strike

As stated last week, all the coal operators in the State of Missouri who are members of the Southwestern Interstate Coal Operators' Association laid their mines idle on Apr. 9. In all, there are 50 mines so laid idle, and these normally employ 9000 mine workers. The action was taken by the operators and advisory committees for the purpose of ending the strike of the mine workers at Kirksville, Mo., who quit work to secure the discharge of a mine foreman. The men at Kirksville, however, refuse to return to work despite the lockout elsewhere, and all conferences have failed in securing an adjustment. The operators are keeping their mines closed till the mine workers' officials order the men back to work. The men are equally determined, and a long strike seems likely.

W. L. A. Johnson, commissioner of the Southwestern Coal Operators' Association, has issued the following statement of the cause of the closing of the Missouri mines:

On Mar. 5 the mine committee at the mines of the Big Creek Coal Co. demanded the discharge of the mine foreman for failure to settle cases with the committee with satisfactory rapidity. The committee claimed that in the adjustment of grievances the conferences between committee and foreman lasted too long and involved the local union in too much expense. The superintendent and the board member, who jointly considered the grievance, could come to no agreement, and a joint statement was prepared for the submission of the issue to the operators' commission and to the district president of the union.

On Mar. 28 the question was still under due consideration and inquiry in the manner provided by the terms of the wage contract. The district president and the commissioner had not even reached a disagreement relative to the matter; nevertheless, the local union ordered the mine workers at the two mines of the company at Kirksville to go on strike. It will be noted, further, that the matter had not yet been presented to the joint board of operators and miners, as is provided under the contract, though this is a further provision which must be complied with in the event of a disagreement between the commissioner and the district president.

New District President Not Loyal to Contract

On Mar. 29 the matter was taken up with District President Grant Parker, and he wired to the local union ordering the mine workers of Kirksville back to work pending a settlement of the case in accordance with the contract. On Mar. 31 President Parker's term expired, and the new district president, D. A. Frampton, came into office. The matter was immediately taken up with him and a request made that he enforce the contract by putting the miners back to work and taking the case up in accordance with the provisions of the interstate agreement.

This he declined to do, notwithstanding the fact that paragraph 5 of Section 6 of that agreement reads, in part, as follows: "If any mine is shut down in violation of this contract, the district organization or the Southwestern Interstate Coal Operators' Association, as the case may be, shall take the necessary steps to promptly put the mine or mines in operation and compel all parties at interest to submit their grievance for adjustment in the manner set forth in Section 1 of this agreement."

The foregoing section further provides that "no grievance at the mine affected shall be considered while the mine is shut down in violation of this contract." It will be seen, therefore, that it is absolutely necessary to start the mine before an investigation can be made. Consequently, the commissioner has instructed the Big Creek Coal Co. to blow the whistle for work every night and morning while the strike continues, signifying thereby its willingness and desire to operate the mines.

Section 1 of the Interstate Agreement governing the handling of grievances specifically provides that "pending a final settlement of any dispute the mine shall continue in operation and all miners, mine laborers and parties involved shall remain at work."

The failure of the new district president, Mr. Frampton, and his officers to comply with the provisions of the contract seems to indicate a revolutionary method of handling strikes and grievances under the contract and constitutes a flat refusal to put into effect the plainly written terms of the contract.

Would Miners End Coöperative Bargaining?

In view of this situation, the advisory committee and officers of the association representing all operators in District 25 have felt that it is necessary for the protection and preservation of the contract to cease operation of the mines in the State of Missouri until the new district officers of the United Mine Workers order the miners at Kirksville to resume work.

The association officers stand ready and willing to consider and adjust, if necessary, any and all grievances immediately upon resumption of work and in accordance with the contract.

The miners of Missouri as a whole have long been regarded as reasonable and conservative men and as having a strong desire for the proper recognition and enforcement of contracts which they regard as being the word of honor of the organization, but a new element appears to have got into control which bids fair to revolutionize the sane and peaceful methods which have obtained heretofore in the negotiations relative to contracts.

The present contract was made only after long-continued effort, the negotiations starting early in May and continuing till Dec. 15, when the contract was signed and made effective. It is believed that the conservative mine workers in the state will realize that the work so expended should not be allowed to come to naught by a repudiation of the terms of the union contract by the officers of the union. It is fully expected that they will declare that they will not tolerate any further violations and there is every confidence that they will demand that the disagreement be adjusted in accordance with the contract.

Kansas Men Restrict Output to Five Cars a Day

The mine workers of Kansas seem to care nothing for the contracts they sign. At mine 48 of the Central Coal and Coke Co., in Kansas, the miners promulgated a rule establishing a five-car limit on every miner's daily production. As the company was fully able to give the men the cars they needed, this five-car output was all loaded out and dumped in 7 hours. The miners quit accordingly, and the drivers and daymen were sent home with short time.

The daymen objected, but the company argued that there was nothing left for them to do. They could not be kept at the mine after all the miners had gone home. As a result there was a strike, and an appeal was made to the district president. He sent a man to induce the mine workers to go back to work, but they refused. Then the men at mine No. 48 induced those at No. 45 to go out in sympathy.

Of course, the strike is in conflict with the contract, which declares that there shall be no restriction on the work of any employee. This strike is one of the means employed to equalize the days in the various mines.

Conviction of John R. Lawson Declared an Error

In Colorado the International Fuel Co., a small corporation despite its name, having a mine at Mt. Harris, in Routt County, has signed a contract with the United Mine Workers of America. On Apr. 11, Attorney General Leslie E. Hubbard filed a confession of error in the case of John R. Lawson, former district president and international board member of the United Mine Workers of America, who was convicted of murder in connection with the strike in the southern Colorado coal fields that occurred in 1914. The attorney general recommends the freeing of Lawson. The latter is, however, not in actual custody, for, though sentenced to life imprisonment, he has been released on bail pending an appeal to the Supreme Court. He has been working at his old calling of miner at a plant in Frederick, Weld County, Colorado.

Wage Increase in the Central Field

What would be the wage increase in the Central Competitive Field was the main question of the week, for that there would be an increase was self-evident. How much it would be appeared likely to be determined by chance and not in any scientific way. It was clear that it would be a flat wage, determined not by the cost of living, nor by any definite determinable basis, but on the fiat of some one party or parties. There was no investigation of the actual increase in the cost of living, not even a cursory one.

Nobody apparently brought to the wage conference of the Central Competitive Field a statement of the various proportions which the purchases and expenditures of the average mine worker bear to one another. There was no scientific basis on which to determine just what the employees have suffered from rising prices. Schedules showing the increase in the cost of certain articles, without any attempt to show their relative importance in the miner's purchasing list, do not lead up to any definite figure expressive of the true increase in the cost of living.

Thus we have only a flat wage, unscientific and possibly unfair—the outcome of a conflict however friendly not the product of reason. It is a wage which is made out of contest, to be contested again when the contract has to be made again, whereas it ought then and always to be modified by immutable economic laws the recognition of which would make the mine workers satisfied and enable the industry to do its work with certainty of peace. Fiats are the bane of industry and order. They settle nothing finally. But when the wage is based on an equitable principle, it is more likely to give satisfaction. Of course, in wage adjustment there must be the original fiat, but thereafter all modifications should be regulated by economic law, and there should be a minimum of jangling about the matter.

Coal Area Embraced by Central Competitive Field

For those who have not in the past read these columns, it may be said that the Central Competitive Field includes western Pennsylvania, Ohio, Illinois and Indiana. It seems strange that it is called by that name, for the word "competitive" has absolutely no value as a designation, for competition may naturally be predicated as to fields in any given district. For this reason, it would appear that the words "Central Field" would be designation enough. If it be thought that the field is not quite central as regards the United States, as indeed it is not, the nomenclature is not bettered by calling it the "Central Competitive Field." The statement still remains misleading.

The conference of the operators and mine workers in the Central Field opened its sessions on Thursday, Apr. 12, at the McAlpin Hotel, 34th St. and Broadway, New York City, with J. C. Kolsem, one of the signers of the call for the present conference, as presiding officer.

White Gives Argument for Advance to Public

Previous to the joint committees going into conference, John P. White, the international president of the United Mine Workers of America, made a statement in which he described the meeting as "a measure of national defense." He said that the miners wished to put their house in order so that the Nation would have no occasion to complain that its coal producers are not performing satisfactorily the tremendously important task assigned to them. "The miners are anxious to do their bit," he said. "They will mine all the coal needed, and do it ungrudgingly. They will not take advantage of the Nation's necessities, but they want to do their bit on full stomachs.

"The war has not yet started," said Mr. White, "but already our members are restless and discontented because prices are so high that the men cannot feed their families except by resorting to the most rigid economy and by depriving themselves of many articles of food that every American family should have. The coal industry is not on a sound, healthy basis so long as this condition exists. The miners are not seeking for luxuries, mind you; they are asking only for what they need.

"This conference is an attempt to meet the situation in a spirit of accommodation and fair dealing, and to deal forehandedly with conditions which, if neglected, might lead to serious trouble later on, when the country's needs become more critical and when the national defense demands that there be satisfactory and harmonious relations in the coal industry."

No One Could Foresee Increased Living Cost

Mr. White said that when the wage agreements, which do not expire until next year, were signed 12 months ago, neither the operators nor the miners could foresee the phenomenal increase in the cost of living. Good business practice, he said, is opposed to enforcing the terms of a contract to the ruin of one of the parties through the operation of conditions that could not be foreseen when the contract was entered into.

"The United Mine Workers never repudiates a contract," said Mr. White, "and we are making no threats at this time. We are merely asking the operators to meet with us in man-to-man fashion and to reach with us a solution of the critical problem that has arisen in the industry. The long and short of it is that our members are not earning enough to feed their wives and families and pay their grocery bills.

"In spite of substantial increases won by them a year ago, the cost of living has forged ahead of wages and is now pinching them hard. This is realized by many operators; some of them have even taken the initiative in proposing higher wages than those called for in the 1916 contracts. Our organization has won the good will of many employers because it has put the industry on a more stable basis and has prevented the recurrence of sporadic strikes. It has been able to do this through wage agreements that assure both fair wages to the miners and continuous peaceful operation to the owners. But continuous operation depends upon fair wages, and the union that fails to obtain fair wages for its members loses its power to prevent irregular and sporadic strikes. We are dealing with a condition and not a theory. Our members are loyal to the union and their pledges, but hunger is not to be denied."

Little more than the work of organization was accomplished in the two short sessions held on Thursday, and the evening was taken up by caucuses held by the operators, the Illinois contingent meeting at the Waldorf-Astoria, the operators from Indiana and Ohio meeting at the Hotel McAlpin, and the operators from western Pennsylvania conferring at the Hotel Knickerbocker. The miners' representatives also conferred among themselves.

Ask 25c. a Ton and 33⅓ per Cent. Increase

The real work began on Friday afternoon, the session continuing from 2 until 6 p.m. The miners' argument was made by J. P. White, Vice President Frank J. Hayes and Secretary William Green, of the miners' organization. They insisted that the increase in wages should not be less than 25c. on the tonnage rates and a 33⅓ per cent. advance on the wage of daymen. They produced statistics showing the increase in the cost of living to prove that even though the increase asked for was granted, it would not meet the necessary increase in the mine workers' daily expenditure.

The miners' representatives said that the car shortages in Ohio and in Illinois had been so acute that during the winter months on the Illinois Central R.R. less than 42 per cent. of the normal tonnage produced along that railway could be moved; and that the miners, owing to this condition, worked less than half time. As a result of this fact and of the increase in the cost of food, the mine workers were in almost destitute circumstances. Similar conditions existing on other railroads were also cited.

White Says "Traditions Have Been Set Aside"

President White, in his opening statement to the conference, said that if anyone on either side had suggested a few years ago that a meeting would be held under such conditions and for such a purpose, the idea would have been ridiculed.

"Traditions," he said, "that have long guided institutions and governments have been set aside, and we are following in the wake of the extraordinary conditions of our times. The things that were considered normal and reasonably satisfactory no longer suffice.

"No one can overestimate the loyalty of the miners to their contracts. It is with reluctance that we have taken our present course, and we would never have taken it had we not been impelled by the severity of the circumstances that confront us. We cannot expect the great masses of men that produce the coal by which the wheels of progress are kept revolving to submit to a situation out of harmony with the trend of events. We asked for this meeting to do in an orderly manner the things that will best conserve the interests of the whole. The cost of living of the men we represent can no longer be met by the wages they are receiving for their labor.

"The coal industry is in a healthy and prosperous condition, and no arguments such as were put forward in former conferences can be advanced now to explain why wages should not be raised to offset the cost of living. I hope that no one will say that we are trying to repudiate our contracts and that we are pleading expediency without justification."

In response to the presentation of the mine workers' case by Mr. White, C. E. Maurer for the Ohio operators, P. H. Penna for the Indiana operators and John P. Reese and E. T. Bent for the Illinois operators discussed the situation as it appealed to them. Frank Farrington, president of the Illinois district, presented the position of the mine workers of his state.

Illinois Operators Demand Unchanged Scale

At the conclusion of the day's session the mine workers' representatives stated that C. E. Maurer, who represented the Ohio operators, and W. K. Field, president of the Pittsburg Coal Co. and representative of the western Pennsylvania operators, had offered an increase of 10 per cent. The Indiana operators were noncommittal. The operators from Illinois objected to giving any increase and sought to hold the miners strictly to the contract which expires Apr. 1, 1918.

At the session held on Saturday, it was decided to refer the wage question to a subcommittee of eight operators and a like number of miners' delegates, this body to consider the entire matter and report back to the joint conference. The subcommittee selected consisted of the following:

Operators—E. T. Bent and H. C. Perry, of Illinois; J. K. Dering and P. H. Penna, of Indiana; A. A. Augustus and C. E. Maurer, of Ohio, and J. T. M. Stoneroad and J. A. Donaldson, of western Pennsylvania.

Miners—Frank Farrington and Harry Fishwick, of Illinois; Edward Stewart and William Mitch, of Indiana; John Moore and G. W. Savage, of Ohio, and Philip Murray and Thomas Metcalf, of western Pennsylvania.

Ex officio—John P. White, international president; F. J. Hayes, vice president; William Green, secretary-treasurer, and J. L. Lewis, statistician, of the miners' union.

The subcommittee organized by electing Mr. White as chairman and Mr. Dering as secretary. A meeting was held Saturday afternoon and another on Sunday, but no agreement was reached.

Political Program of Mine Workers' Leaders

At the conclusion of the session of the joint committee on Saturday morning, the miners' delegates adopted resolutions calling upon Congress to pay for the war by taxing incomes and to place high direct taxes on land so as to prevent undeserved profits to absentee landlords.

The resolution referring to the taxing of incomes provides that all bonds, certificates of indebtedness and other obligations issued by the Government for war purposes shall be paid by a tax to be levied on all net incomes in excess of $2000 for unmarried persons, and in excess of $3000 for married persons, beginning at 2 per cent. and increasing on a sliding scale to a point which will permit of no individual retaining an annual net income in excess of $100,000, such war tax to continue until the bonds, certificates of indebtedness and other obligations issued for war purposes are paid.

The resolutions also provide that all supplies for war service, including transportation, shall be furnished to the Government at a reasonable profit, to be fixed by Congress; that Congress shall enact legislation preventing the sale of necessaries of life during the war at excessive profits; and that intentional failure to supply the Government with correct figures as to income or as to profits on such sales and service, and furnishing the Government with defective war supplies, shall be a felony, punishable by imprisonment.

Illinois Operators Oppose Advance Offered

At the conclusion of the afternoon session of the subcommittee on Monday, it was announced that the operators from western Pennsylvania, Indiana and Ohio had agreed tentatively to give the miners an increase of 20 per cent. on mining rates and day work. It was also announced at the same time that the Illinois operators had not bound themselves to this tentative understanding, but it was stated that the subcommittee would make another effort to induce the Illinois operators to preserve intact the four-state agreement.

The evening was taken up with conferences between the operators from the various states.

The conference ended late on Tuesday afternoon, Apr. 17, when the report which the subcommittee had formulated at the morning session was adopted. The document ran as follows:

New York, N. Y., Apr. 17, 1917.

Your subcommittee recommends the adoption of the following:

First—That pick and machine mining be advanced 10c. per ton in the states and districts comprising the Central Competitive Field; and that the screen-coal mining prices in the "block-coal" field of Indiana be advanced in proportion to the mine-run prices herein agreed to.

Second—That all day labor now receiving $2.98 and $3 per day be advanced to $3.60 per day.

Third—That monthly men and all other classes of labor employed in and around the mine be advanced 60c. per day, except as follows: Trappers shall receive $1.90 per day, and all boys now receiving $1.57 per day or less shall be advanced to $1.90 per day. No advance shall be paid on dead work or yardage. This advance shall be come effective Apr. 16, 1917, and continue until Mar. 31, 1918.

Miners Declare Themselves Loyal to Contracts

The following resolution, adopted by the miners' representatives, was also made public:

"The United Mine Workers of America regard contracts between operators and miners as sacred and binding. It is of supreme importance that agreements be maintained inviolate. Right relations between coal operators and coal miners can be maintained only when agreements honorably entered into are religiously observed.

"As representatives of the United Mine Workers, it is our purpose to educate and instruct the membership regarding the necessity of complying with contract provisions. If individual members or local unions of the United Mine Workers of America disregard contract provisions and by so doing attempt to enforce demands which in effect abrogate or violate a contract in any manner whatsoever, we will require such members or local union to observe the contract, and in case they fail to do so they will be expelled from membership in the United Mine Workers of America.

"This statement is made because we realize that it is the duty of the representatives of the organization to require its membership to observe to the fullest extent all the provisions of the joint agreement between the coal operators and coal miners."

White Writes a Eulogium of the Coal Operators

Mr. White also issued the following statement:

"The conference just ended has set a new mark for the prompt adjustment of relations between employers and employees in a spirit of patriotism and mutual accommodation, worthy of good citizens in this time of emergency.

"Operators in the great bituminous fields of Illinois, Indiana, Ohio and western Pennsylvania have been quick to appreciate the necessity of wage advances to meet the difficulties faced by miners who were anxious to do their share, and asked only for adequate provision in the wage schedules for the vital needs of themselves and their families. Substantial increases have been agreed upon, and the miners will now go to work with redoubled energy, confident that the family larder will not go empty and that their families will not feel the pinch of need.

"This is in marked contrast to the turmoil and confusion that swept over the English coal industry and threatened to paralyze England's industrial activities soon after the great war began. American coal operators have accepted as valid our opposition to the payment of bonuses, always a source of controversy and discord, and have met our demand for a flat increase, so that the miner will know definitely what his earnings are to be. Miners will always object to a bonus method of payment because it is capricious and uncertain and offers as a gratuity what the miner claims as a right, and for the further reason that bonuses are never guaranteed by binding agreements and may be withdrawn at any time.

"The precedent established at this conference should be indorsed and followed in the other coal-mining districts of the country. The situation is everywhere similar to that existing in the Central Competitive Field. Everywhere there have been unforeseen and unprecedented advances in the cost of every article of necessity. Now, before the full pressure of war requirements is upon us, is the time for getting together and agreeing on such a readjustment as will put the entire coal industry of the nation on a sound and healthy basis."

The public cannot but feel pleased with the admirable spirit disclosed in these negotiations. Even though the increase was not as scientifically determined as in the Canadian adjustment recently made, the cost of living was definitely kept in mind as the basis of the wage settlement.

Roster of Those Participating in Conference

The operators and mine workers were:

Illinois Operators—Principals: E. T. Bent, W. B. Jess, Rice Miller, C. M. Moderwell, W. L. Schmick, H. C. Perry, John P. Reese, H. C. Adams. Alternates: James Forrester, J. E. Rutledge, C. I. Pierce, J. M. Jenkins, W. J. Spencer, Daniel Clark, S. A. Shafer, L. H. Smith.

Illinois Miners—Principals: Frank Farrington, Harry Fishwick, Walter Nesbitt, Edward Dobbins, Ben Williams, Mose Johnson, Pio Franckey, George L. Mercer. Alternates: Micael Pietrzak, Herbert Halls, Stephen C. Sullivan, Ben Firth, William Hutton, Hugh Willis, Charles Grace, McElroy Trout.

Indiana Operators—Principals: E. D. Logsdon, David Ingle, A. M. Ogle, W. J. Freeman, M. L. Gould, J. K. Dering, John Chesterfield, P. H. Penna. Alternates: H. B. Talley, J. C. Kolsem.

Indiana Miners—Principals, District 11: Edward Stewart, William Mitch, W. H. Raney, M. H. Head, Archie Forbes, Jack Granger District 8; James J. McKinney, Edward Haverkamp. Alternate: James Shiel.

Ohio Operators—Principals: G. C. Weitzel, George M. Jones, A. A. Augustus, M. Gallagher, C. E. Maurer, Joseph Purseglove, S. H. Robbins, W. H. Haskins.

Ohio Miners—Principals: John Moore, Lee Hall, G. W. Savage, Sanford Snyder, Thomas J. Price, John Saxton, William Roy, W. C. Thompson.

Western Pennsylvania Operators—Principals: J. T. M. Stoneroad, J. G. Patterson, W. M. Henderson, James Patterson, J. A. Donaldson, J. M. Armstrong, T. W. Guthrie, W. K. Field.

Western Pennsylvania Miners—Principals: Philip Murray, Robert C. Gibbons, William Hargest, Thomas Metcalf, E. D. Reed, John Rodgers, Clarence Fowkes, James McDonald, John O'Leary, International Board member.

Efficiency in Mine Inspection

By J. J. Rutledge*

SYNOPSIS—Efficiency in the work of inspection. Need of careful inquiry in respect to conditions affecting the health and safety of workers. Good laws and capable, honest and fearless inspectors required. System and coöperation essential to success. Results shown in other inspection departments, at home and abroad.

The Standard Dictionary gives the following definitions of efficiency and inspection:

Efficiency: (1) The character or quality of being efficient; the power that accomplishes a desired or designed work; the quality that produces the best business results or the most effective service; effectiveness; as, the efficiency of an agent. (2) (Specific) (a) the state of possessing adequate skill or knowledge for the performance of a duty or calling (b) (Mech) The ratio of useful work or the effect produced to the energy expended in producing it.

Inspection: (1) The act or process of looking into; especially, a careful, critical investigation or scrutiny. (2) An official examination by persons appointed for the purpose.

With these definitions in mind I will speak briefly on this subject that is of such deep interest to us all.

Mine Inspections—There is urgent need for an inquiry into those conditions existing in our mines that make for safety of life and the conservation of health of all employees in and about the mines. Such inquiry or inspection should be made by some person who has received his authority from and is backed by the police powers of the state. An inspector should be capable of performing his work of examining a mine and should be thoroughly honest and possess sufficient courage to make the conditions that he finds to exist therein known to all interested. The mine owner and his representatives have one interest, while the miners and other employees have another interest. Both are honest in their convictions, but both are interested parties. A proper inspection of the mine and an unbiased statement of the conditions disclosed thereby can only be made by a disinterested person whose chief purpose is to satisfy his own official conscience as to the safety of the mine and its surroundings.

Need of Careful Inspection Recognized

That such inspections are desirable and necessary is evidenced by the fact that nearly all large coal-mining companies have their own company inspectors, who generally report to but one official of the company, usually the general manager, and are responsible to him alone, and receive instructions solely from that official. A private inspector is, as a rule, entirely independent of the operating department.

Efficiency in mine inspection requires: 1. A good mining law drawn to fit the peculiar conditions in the state. A mine inspector can not enforce his recommendations in regard to safety, unless he has been given certain police powers by the state mining law. In some instances, through sheer force of character, mine inspectors have enforced recommendations that were not contained in the state mining law; but such cases are rare. A well drawn mining law, generally and impartially enforced, is essential to efficiency in mine inspection.

2. A capable, honest, faithful and courageous mine inspector is needed. The mine inspector must possess all of these qualifications, in my judgment, in order to be able to make efficient inspections; and, in addition, he should be of a judicial temperament and should never take a side in disputes, or be guilty of showing partiality to either of the contending parties. He should be able to discriminate between bona-fide and bogus complaints.

3. Every inspection should be made according to an established system that will show all the conditions, good and bad, in the mine and about it. An officially signed statement of the conditions found to exist in and about the mine should be posted near the mouth of the mine.

4. The mine management and employees should cooperate in enforcing any orders of the mine inspector and in maintaining proper mine discipline. Unless these two interested parties coöperate in the endeavor to remedy or eliminate dangerous conditions the inspector's recommendations will not bear fruit.

In Addition to the Human Elements

These are, in my opinion, the human elements that enter into an efficient mine inspection. Another requirement is a good blueprint of the mine map, folded to fit the pocket and drawn to a good working scale, showing all the mine workings, both live and abandoned, the course of the ventilating current, and the manner in which it is conducted through the mine, all haulage roads, airways, manways, pillar workings, etc. The inspection should be made in a careful and painstaking manner.

The results of the inspection should be recorded by some standard plan of reporting mine inspections, which will eliminate as far as possible the personal equation of the inspector, and will permit a true comparison of the results of the inspection of one mine with those of another.

An inspection should include a search for the presence of inflammable coal dust, the occurrence of gases, and evidences of the improper or dangerous use of explosives.

I have been informed that the boiler-inspection laws of some states require the inspection of a boiler while it is under construction. Also, that the new code of the American Society of Mechanical Engineers requires that boilers be constructed of certain standard material and in a uniform manner. It would be well if our mining laws required the development of mines only along certain definitely approved plans and that these plans be so approved before the mine development was begun.

The Results of Locomotive Boiler Inspection

Kindly permit me here to refer to a few facts showing what has been accomplished both at home and abroad by an efficient system of boiler inspection.

The annual report of the chief inspector of locomotive boilers for the fiscal year ended June 30, 1915, has just appeared. The report shows that in the last four years of service the annual number of accidents has been reduced from 856 to 91; the number of persons killed by such accidents, from 91 to 13; and the number of persons

*Mining Engineer, Bureau of Mines, McAlester, Okla. Address delivered before the Mine Inspectors' Institute of the United States of America, June 15, 1916.

injured, from 1,005 to 467. Even during the past year 32,666 locomotive boilers and their appurtenances have been found defective, and 2,027 were ordered out of service. In the face of facts like these, there are those who still oppose such inspection and supervision as an unwarranted interference of individual rights.

Boiler Inspection in Germany

In the entire Empire of Germany, not including boilers used in the military and naval service, there were in the year 1914 only eight explosions of steam boilers. One of those boilers was built in 1873, one in 1874, one in 1880, one in 1881, one in 1892, one in 1902 and two in 1906. I mention the dates as showing that all of these boilers were well along in years; one-half of them having served more than a quarter of a century. Low water is given as a probable cause in five of these eight cases. In three of the explosions no personal injuries were caused, while five persons were killed in the two remaining ones, which seriously injured two and slightly injured seven other persons.

In the same period there occurred, in the United States, 575 accidents to boilers, by which 300 persons were killed and 476 more or less seriously injured.

After reading his paper, Doctor Rutledge continued:

I think, Mr. President, it shows just as much judgment to require a man to submit a plan of mining work before opening up a mine as it does to require a plan for a building to be submitted by a building contractor for the approval of a competent board. We require plumbers, masons and contractors to submit their plans, yet we permit men to open mines and jeopardize lives without submitting plans. So far as my research has extended, I have been unable to find mention of such a requirement or any provision in the laws of the coal mining states, relating thereto.

Systematizing American Boiler Practice

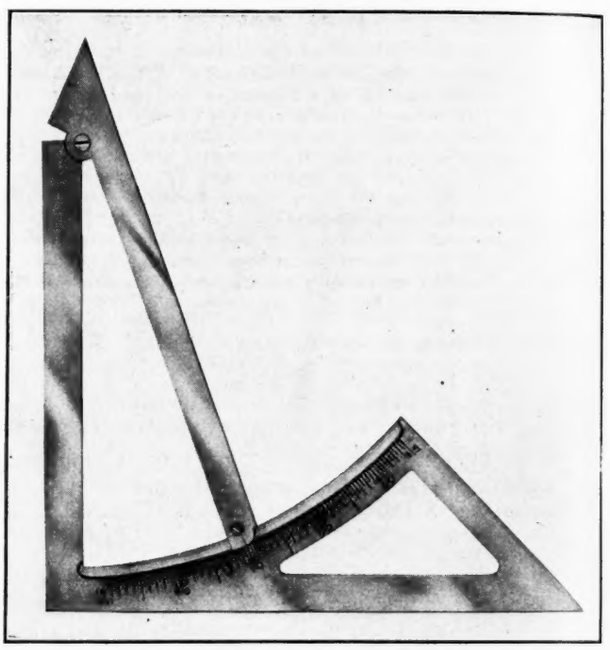
Not long ago I had the opportunity of reading some discussion that arose with the chairman of a committee who was introducing into this country a uniform system of construction and inspection of boilers. The American Society of Mechanical Engineers, boiler makers and boiler inspectors got together and formulated a proposed code of construction and inspection of boilers. All this work they did voluntarily. It has been estimated that had this work been paid for at the rate usually paid for such proceedings, it would have amounted to more than four million dollars.

After several years' work they prepared 5,000 copies of their proposed code and sent them throughout the world, with the request that others submit their suggestions, comments and criticisms. In response to that request 5,000 comments and criticisms were received. After some months these comments were classified, the desirables accepted and the undesirables rejected, and incorporated in another proposed code. Then a second draft was sent out to all interested parties. This time, 500 comments came back, and those that were thought desirable were accepted and incorporated in the code, while the undesirable ones were rejected. The result is the code that is now being used by the American Society of Mechanical Engineers at the present time.

Universal Triangle

The adjustable triangle shown has recently been brought out by Charles E. Baker, Indianapolis, Ind., and is known as the Hellman universal triangle. It is made of nickel-plated steel in 6-in. size and is $\frac{1}{8}$ in. thick. As may be seen, the instrument consists of a 45-deg. triangle, a part of the hypotenuse of which is hinged in such a manner that it may be adjusted to form any angle from 0 to 45 deg. with one side or an angle of from 90 to 45 deg. with the other side, says the *American Machinist*.

The loose end of the hinged section is provided with a groove that fits over a tongue milled at the proper



UNIVERSAL TRIANGLE

radius in the body of the triangle. Friction is relied upon to hold the hinged section in the proper position. The protractor is graduated to $\frac{1}{2}$ deg. The whole device is flat and can be used either side up, there being no projecting screws or nuts to interfere.

Rope Capacity of Drums

The rule used by A. Leschen & Sons Rope Co. for computing the rope capacity of any size of drum is as follows: Add the depth of flange in inches to the diameter of the drum, multiply this result by the out-and-out width of the drum and by the depth of flange. This product is then multiplied by the factor in the accompanying table corresponding to the size of the rope used.

FACTORS FOR DRUM CAPACITY

$\frac{1}{4}$ in.	4.16	$\frac{7}{8}$ in.	0.342	$1\frac{3}{4}$ in.	0.085
$\frac{3}{8}$ in.	1.86	1 in.	0.262	$1\frac{7}{8}$ in.	0.074
$\frac{7}{16}$ in.	1.37	$1\frac{1}{4}$ in.	0.207	2 in.	0.066
$\frac{1}{2}$ in.	1.05	$1\frac{1}{2}$ in.	0.167	$2\frac{1}{8}$ in.	0.058
$\frac{9}{16}$ in.	0.828	$1\frac{3}{4}$ in.	0.138	$2\frac{1}{4}$ in.	0.052
$\frac{5}{8}$ in.	0.672	$1\frac{5}{8}$ in.	0.116	$2\frac{3}{8}$ in.	0.046
$\frac{3}{4}$ in.	0.465	$1\frac{7}{8}$ in.	0.099	$2\frac{1}{2}$ in.	0.042

This rule applies of course to a drum on which the rope is to be wound in successive layers up to the full height of the flange. As published in the "Handbook of Mining Details," p. 184, the rule is incomplete, as it omits to multiply by the factor "depth of flange."—*Engineering and Mining Journal.*

Editorials

An Ill-Considered Law

Congress has lately fallen into the habit of carelessly enacting laws without sufficiently considering the matter in hand to determine what the ultimate effects, as interpreted in different ways, may be. Thus, the Panama Canal bill, stipulating that no rail transportation lines shall also engage or be directly interested in the transportation of either freight or passengers by water, has fallen with a heavy hand on the New England anthracite trade. Strange as it may seem, this measure, designed for the purpose of regulating traffic in one direction, has reacted in such a way as to have a very important influence on shipping in a directly opposite direction.

When the law went into effect, the Delaware, Lackawanna & Western R.R., which was operating barge lines from New York to New England points, was advised by its counsel to dispose of them. One result of this is that New England buyers are now paying from $1.50 to $2.50 a ton freight on coal from New York, as compared with 40 to 65c. formerly, though, of course, this may be largely due at the present time to the extraordinary freight rates prevailing on all ocean shipping. It is undoubtedly a fact, however, that the disposal of this barge line forced the Lackawanna company out of the New England market entirely, since it has no through rail connections with that section.

How Can We Do Our Bit?

The conflict upon which the United States has just entered has been termed—and justly so—an engineers' war. It is preëminently a matching of resources, of industries and of strength, not alone in men, but in supplies of all kinds. More than any other war in all history this is a war of science and power, the major portion of which is mechanical. Machinery is being used as never before, and to build and operate railroads, tractors, "tanks" and other military engines requires fuel.

This country produces roughly 40 per cent. of the world's coal. Of our Allies, Italy and Serbia produce little fuel. Russia does not mine enough coal for her normal needs. The mines of Belgium and France are in large measure held by the enemy, and Great Britain has been unable to meet the demands made upon her coal pits by the shortage of fuel in those countries normally receiving their supply from her.

Coal is almost as essential to modern warfare as is food and ammunition. Napoleon stated that he used his soldiers' legs to win battles. Today the same service is performed by locomotives and automobiles, trucks and tractors. While it is quite true that the "old reliable straw burner"—the army mule—is still employed in military transportation, he is far too slow and too weak for the larger problems encountered, and his use is confined chiefly to local distribution.

The burden of war has always weighed heavily upon the burden-bearer—the means of transport employed. In ancient times this was the backs of slaves, hired packers and the like. Later, animals were extensively used. Today, these have been replaced by mechanical transport in its many forms.

Not only must the fuel industry of the land furnish the energy consumed in transportation, both by land and sea, but it must also furnish the essence of destruction employed, for the military explosive now largely used is no longer a mixture of sulphur, saltpeter and charcoal, but a product of the byproduct coke oven—not gunpowder but trinitrotoluol. Furthermore, probably nine-tenths of the energy employed in munition manufacturing is derived from coal.

Upon the coal industry, then, will rest in no small degree the prosecution of the war to a successful issue. It is the desire and intention of *Coal Age* to print from week to week news of what the industry is doing in this direction. In addition, it will act as an open forum where the best ideas and suggestions of those engaged in the industry concerning what that industry can and should do to aid the Nation's welfare may be freely enunciated and discussed, to the end that the cause of justice and equity, freedom and right may most speedily be vindicated.

Already two new cabinet departments vitally affecting the industry are being discussed. What do the readers think can and should be done? How can the industry be of most service? What aid can the Government render the industry? What aid can the industry render the Government? Contributions along this line will receive prompt and careful attention.

Division of Mining Labor

There is already a somewhat minute division of mining labor, but that part of it which is most scientifically divided is not so much the getting of the coal as its underground transportation and the work incident thereto. For the most part, in the coal mines of the United States, there are only three divisions in coal getting—cutting, scraping and loading. In some mines shotfiring is another division. There are collieries also where the shotfirer charges the holes as well as explodes the charges. Then there are operations like those of the H. C. Frick Coke Co., where to cutting, scraping, loading and shotfiring is added drilling work as a fifth division of labor.

When cutting, scraping and loading are introduced the division of labor often creates some difficulty; for the scraper is apt to be idle when the cutter wants to work, and the loader wants to be off when the undercutting crew are willing to do their part of the labor cycle. The operator, consequently, is likely to feel that the differentiation of employees has gone far enough.

"One class of laborers will not," he says, "exchange occupations with another, for the loader and scraper cannot cut, and the cutter will not scrape because the remuneration and dignity are low; nor will he load, be-

cause it takes more physical exertion for which he is not equipped and to which he is not disposed. Moreover, he does not have the tools. You cannot induce the men to change their *rôles,* and frequently you cannot persuade certain cutters to accept certain scrapers. Then, when you seek to move loaders over, you find they object to the transference as they have so many tools to move, and working places have such different characteristics.

"Some have bad drawslate where many props must be set, others have good roof and no rubbish to handle. Some places have wide pillars and some narrow; some have clean and other dirty coal; in some the coal comes down in blocky masses, in others it breaks up conveniently. As a result a loader who has secured a good place objects to moving, especially to one which the cutter has not undercut with the needful expertness.

"He objects to the delay and to the uncertainty of a shift in working place. Besides, the turn that day may not be so rapid in the section of the mine to which he is moved. Any way, as he has shot the place in which he is working, he will not move till he has cleaned it up, because he does not want, naturally, to have another man enter into the fruit of his labors and the work of his powder."

But a little more division of labor will relieve him of the necessity for burdening himself with many tools. With a greater concentration of work in the mine he will not be called to move any great distance, and he will find the conditions are similar and the turn the same. Consequently, he does not doubt that he can do as well in the new place. Concentration of work makes it possible to so superintend the work that the loader will be assured of conditions favoring the utmost efficiency.

Moreover, granted that the loader undercuts no coal, drills no holes, supplies no powder and explodes no charges, he has no vested interest in any of the coal lying on the floor of the mine. Not until he gets the coal in the car does he obtain such an interest. At any moment the boss can say to him, "Move over to Room 36 when that car is loaded," and the loader will not demand the right to finish loading the whole cut.

He has no vested interest in the coal remaining. Another may load that at any time for all he cares. The roof may fall and bury it; to that he is indifferent. He has expended no labor on it, for he is a loader pure and simple. What his shovel has not lifted he has no claim upon. So he goes readily from room to room as they are close together and his equipment is light; no powder, no drill, no squib or fuse is needed; a pick or so, may be, a shovel, an ax and his lighting equipment are all he requires. A quick move and he is in his new place and working as industriously as ever. He is ready, therefore, to put his shoulder to the wheel wherever there are wheels to shoulder. So the drawing of the coal goes on scientifically, despite the absence of a few men, or the lower competence, ability or zeal of a few of the workers along the working face.

At the same time the driller and shotfirer have less distance to travel. They do not cover a large territory of workings at such mines, such as M. D. Cooper recently showed was customary in the Pigeon Creek field. The idea is not (as in the field to which he refers) to start a series of small breaklines made safe by the presence of large bodies of unbroken coal. This plan involves the utmost deconcentration. At the H. C. Frick Coke Co.'s mines the opposite idea prevails—long breaklines and concentrated operation. This has made it possible for each loader to obtain an average of 19 tons a day. Some men, according to the statement of Patrick Mullen in the discussion of his paper before the Engineers' Society of Western Pennsylvania, load the unbelievably large tonnage of 68 and 80 tons per working day.

W. L. Affelder declared, in the same discussion, that at one of the mines of the Bessemer Coke Co., using the concentration method, he counted on 17 tons of coal per day from each loader and found he could get it, many of the loaders doing far more than that stint. As might be expected, it does not seem that we have closely approached as yet the limits of mine efficiency.

Outlook in the Anthracite Trade

The individual operators have been making sales at the full winter circular on the prepared sizes of anthracite coal, and $3.50 is not considered high for pea coal. In some cases sales have been made at $4.65 for egg, stove and chestnut, with pea at $4. With such prices in April, there are some in the trade who claim that radical changes will occur in the coal business before next winter. Present conditions should not be allowed to continue, as there are brokers who are making profits of 25 to 50c. per ton on large consignments of coal without handling it in any way or taking any financial risks.

On the other hand, there are some who point to the fact that a year ago the demand for coal was insufficient to absorb the production, and early in June the largest company was storing all sizes and was not working full time at that. Its collieries were at times worked but four days a week, and during July and August only two; yet even then the company was compelled to store fuel. If the mines are worked full time all summer, much more coal will be stored in the people's cellars and in the dealers' yards than ever before.

In other years the dealers have usually held back until about June, awaiting offers from the individuals who usually sold in blocks during July and August, and often in September, at the May prices. This is why the companies either shut down or stored coal. Dealers will pay more for their coal if they have to, and if the possibilities of mining are as good as last year, the future may not be as dark as it is pictured.

But this optimistic view does not take account of the large number of men who are already being taken out of the mines to fill various arms of the Government service, not to mention the huge army which is likely to be recruited soon. It would also be liable to an upset if the anthracite interests should heed the call from the manufacturers and divert the coal from the dealers to them. In the instance of egg coal, even now the domestic market is short because it is being shipped to gas companies and iron furnaces in lieu of broken, the production of which is small on account of it being more profitable to break it down into smaller sizes.

The Government should consider these points carefully in laying out its program. If the situation is intelligently handled, there will be no cause for alarm. If not, the industries of the country may be completely demoralized or severely crippled by the inadequate fuel supply.

Discussion by Readers

Mine Discipline

Letter No. 2—Reading the letter of G. H. Lewis, on the subject of mine discipline, *Coal Age,* Apr. 7, p. 634, recalls the remarks made by Tim Goldon regarding the responsibility for accidents under the mining laws of Indiana. In his letter, *Coal Age,* Feb. 17, p. 329, Mr. Goldon claims that the mining laws of the state are lax and asks, "How can these men be held responsible for what the law does not require of them?"

It seems to me that Mr. Goldon has not read all of Chapter 7 of the act approved Oct. 5, 1908, which provides a penalty of a fine not to exceed $500 and imprisonment in the county jail for a period not to exceed six months, for any violation of the act or refusal to comply with its provisions, which includes explicit instructions in regard to the preparation and firing of shots in mines.

Mr. Goldon will pardon a reference to my own experience in this line, which shows that all that is needed is discipline to enforce obedience to instructions. Several years ago I took charge of a mine where the bad practice of shooting on the solid had been in vogue for some time. I reported the matter to the superintendent the second day after my arrival, and the following day he accompanied me in an examination of the mine.

A Bad Practice Stopped

As a result, the superintendent informed me that the practice of shooting on the solid "must be stopped at once" or shotfirers would be killed and I would be held responsible. This set me to thinking, and I argued, as Mr. Goldon has done, that the law did not hold me responsible for such acts of the men. In reply, however, I was told to "stop the practice at once," which I determined to do or quit the job.

The next day I notified the men that anyone found violating the law would be discharged, and this was followed shortly by eight miners receiving the full penalty, in which action I was supported by the miners' officials and the superintendent of the company. This broke up the practice in that mine and I had no further trouble in that respect.

I must take exception to Mr. Goldon's accusing me of knowing that "the coal operator is powerless to prevent such accidents under the present arrangements"; and, further, that my experience will enable me to know that "the average miner thinks or cares little for the life of the shotfirer who must fire his shots."

Let me say that my belief is that coal companies would not sink shafts and install the necessary equipment and allow it to be destroyed by men who have no regard for law and order. The instructions of my company to me have always been, "We would rather stop producing coal than be blamed for killing shotfirers."

My experience has taught me that miners are creatures of circumstance, and that, in an environment where they are allowed to do their work in a haphazard way, they grow careless and adopt the way that will give them the least trouble. Just here is where the management should step in and demand the protection of human life and property.

In closing, allow me to say that mine discipline is a matter that should receive the closest attention of the officials in charge. An official who does not punish, or prosecute if need be, a workman for violation of the law or failure to perform his duty or obey instructions is responsible for whatever results may follow. His thought and effort should constantly be spent in removing conditions that invite accident. The enforcement of law and discipline for its violation require courage, the lack of which can only end in disaster. William Jardine.

Universal, Ind.

Mine-Safety Inspector

Letter No. 2—I am glad to see the question of employing a mine-safety inspector brought forward for discussion in *Coal Age.* I believe this is an important factor in the operation of a mine, for more reasons than one.

The employment of a safety inspector will undoubtedly reduce the number of accidents that would otherwise occur through the carelessness, neglect or ignorance of men employed in the mines. It will also have an important bearing on maintaining the output of the mine, especially when labor is as scarce as it is at the present time.

Every man disabled by accident means a loss of tonnage for every day he is unable to work, unless there is a man that can be put in his place, which is not generally the case under conditions prevailing today in coal mining. Moreover, every accident that occurs in the mine means, besides delay in putting out the coal, extra expense for medical attendance and accident liability, together with the prospect of crippling the man for life and imposing a heavy burden on his family. There is, too, the possibility of injuring the future prospects of his children by depriving them of the support and education needed to fit them for life.

The Work of a Safety Inspector

In Letter No. 1, *Coal Age,* Mar. 31, p. 572, "Vigilant" has well remarked that a safety-mine inspector if competent and industrious "will earn more than his salary for the company that employs him." I am sorry to say, however, that few mining companies are willing to pay the salary of a good safety inspector. The result is that the man entrusted with this work is often only half equipped for his duties.

The accumulation of gas in the mine workings is not, by any means, the most prolific source of accident, as is clearly seen from the inspectors' reports. To avoid accidents of every kind, a competent man must be employed

who will devote his entire time to the inspection of every working place, as well as the manways and air passages, and give needed instruction to the men while they are at work. Such an inspector should have the authority to stop men whom he finds working in dangerous places or employing unsafe practices.

While the conditions prevailing in working places will always demand the first attention of a safety inspector, his next duty in importance will be a study of the conditions attending the haulage and hoisting of coal. One of the most difficult tasks the inspector will have to perform is to restrain motormen from taking chances, as many of these are young men willing to run many risks that older men would not assume.

The daily report of a safety inspector will reveal many dangers that can be removed promptly before an accident results. In my opinion, a safety inspector should be competent to give first-aid instruction and train men in mine-rescue work and the fighting of mine fires. Indeed, there are many ways in which he can prove his worth.

OSTEL BULLOCK.

Herrin, Ill.

Reopening a Flooded Mine

Letter No. 2—Replying to the inquiry in regard to reopening a flooded mine, *Coal Age,* Mar. 24, p. 533, I will submit the following:

1. This being a shaft mine lying at a depth of 1200 ft. below the surface, the only practicable means of unwatering the mine is to resort to pumping. Baling out the water with water buckets or large tanks would be impracticable, owing to the great depth of the shaft. For practical reasons, also, it would not be advisable to attempt to employ the air-lift in this case.

PUMPING OUT THE WATER

My preference would be to use either a Gould or a turbine pump, having a capacity of 1000 gal. per min. The most feasible plan to adopt, to my mind, would be to support the pump above the water in the shaft, by means of a swinging cradle or a temporary platform.

The inquiry states that the area worked out in the mine is about 100 acres and, the coal being 3 ft. thick, the cubic contents of the workings, for this area, making no allowance for pillars and waste, would be 100 (3 × 43,560) = 13,068,000 cu.ft. The quantity of water filling this space would be 13,068,000 × 7.48 = 97,748,640 gal. Making some allowance for pillars and waste material in the mine, however, the quantity of water to be pumped out may be taken as, say 80,000,000 gallons.

The capacity of the pump being 1000 gal. per min., and the inflow 200 gal. per min., it is safe to estimate on a net discharge of 800 gal. per min. The time required for pumping, on this basis, would be 100,000 min. or, say 1666 hours. Then, allowing 2 hours in each day of 24 hours for delays and repairs, it will take about 76 days, or 2½ months, to unwater the mine.

2. The same equipment can be employed permanently for keeping the mine free from water. However, the capacity of the pump in this case, being five times the quantity of water flowing into the mine, it will only be necessary to pump one-fifth of the 24 hours each day. This arrangement will also provide a large margin of safety for any increase in the flow of water into the workings.

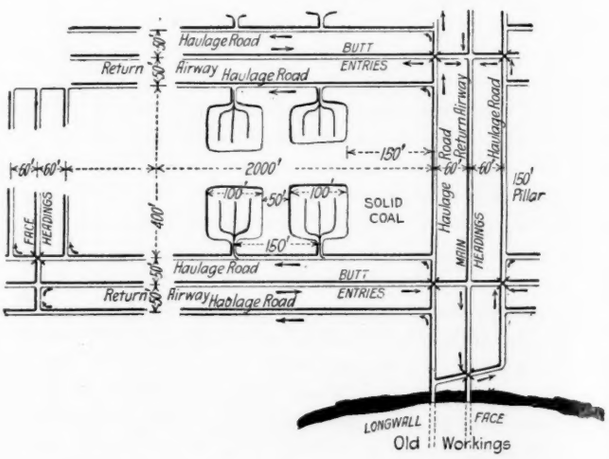
3. Should it be desired to use a smaller pump in the permanent plant, it would be well to estimate on the pump lying idle for, say at least, 6 hours of the 24 hours each day, which would give ample time for making all necessary repairs. This would necessitate providing a sump having a capacity of 6 × 60 × 200 = 72,000 gal., which corresponds to practically 10,000 cubic feet.

To excavate a sump of this size is a serious undertaking. Instead of making the excavation in the bottom, I have sometimes adopted the expedient of driving a short blind heading in the solid coal and closing the mouth of the heading with a concrete dam. I have found this to be a cheap and effective method of providing the necessary sumpage.

FUTURE WORKING OF THE MINE

4. In my opinion the safest and at the same time the most practicable and profitable method of working this seam of coal with sandrock top and bottom will be to adopt a system of room panels. The worked out area mentioned will probably be more or less elliptical in form. Before proceeding with the new work, it will be necessary to clean up the main entries leading from the shaft. These entries should then be extended in the solid coal beyond the line of the old working face, for a distance of 150 ft., before starting the crossheadings to form the panels. In the later development of the mine I would leave a solid pillar of coal 150 ft. thick all around the old workings.

5. As shown in the accompanying figure, the small panels mentioned consist of rooms driven 100 ft. wide



STARTING PANEL WORK FROM A LONGWALL FACE

with 50-ft. pillars between them. As indicated in the figure, three tracks are laid in each room. After the rooms have reached their limit, the pillars are drawn back by driving a narrow heading up the center of each pillar and taking the coal out through this heading on the retreating plan. I think this method would avoid any possibility of a squeeze taking place.

The butt headings, assuming a level seam, should be driven 400 ft. apart to provide for rooms 200 ft. deep. Assuming that the extent of the property is sufficient, the butt headings should be driven a distance of 2000 ft. before starting new face headings, from which butt

entries are driven 400 ft. apart to the right and left, as before.

6. It would be my preference to mine this coal with shortwall chain machines.

7. By double-shifting all entries, in six months there should be places available for 50 loaders, who would each load an average of 9 tons a shift and provide an output of 450 tons of coal. Another 50 or 75 tons of coal would come from the headings. In addition to this, when the entries are double-shifted, there would be 50 or 75 tons more loaded at night. At the least estimate, in six months' time, this mine should put out 500 tons a day; but this estimate is quite indefinite, owing to lack of sufficient data. JOSEPH VIRGIN.

Moundsville, W. Va.

Ignition of Gas by Electric Lamps

Letter No. 2—The introduction of electric lamps into mines has provided two new elements of danger, in respect to the ignition of gas, quite distinct from the question of ignition by a flame lamp. It has been generally accepted that the ignition of gas may result from an electric spark, since most of the experiments performed have used that means of producing the ignition of the gas. For this reason, one may readily be pardoned for doubting the safety of an electric lamp in the presence of an inflammable or explosive mixture.

In the case of an electric lamp, when the bulb of the lamp is broken, it is possible for ignition to take place either by sparking or by the burning out of the unbroken filament. In speaking of the possible ignition of gas by sparks and arcs, H. H. Clark, of the Federal Bureau of Mines, states in Technical Paper 47, p. 9, as follows: "Such sparks and arcs as are obtainable from a portable electric-lamp outfit of not more than six volts are not capable of igniting explosive mixtures of mine gas and air, if the short-circuit current of the batteries cannot exceed the values stated on a previous page of this paper." The values given are: For batteries not exceeding 2.5 volts, 100 amp.; not exceeding 4 volts, 85 amp.; not exceeding 5 volts, 65 amp.; not exceeding 6 volts, 45 amp. These amounts cover the range of voltage for portable or miniature lamps such as are used by miners.

STANDARD VS. PORTABLE ELECTRIC LAMPS

The answer given in reply to "Mine Foreman's" inquiry in regard to the ignition of gas by electric lamps, *Coal Age*, Mar. 31, p. 574, relates chiefly to standard lamps whose voltages range from 50 to 220 volts. In the experiments of the Bureau of Mines, special attention was given to ascertain the maximum current that would flow as a result of the short-circuiting of a lamp battery, which was admitted to be "a remote possibility with a properly constructed equipment." The result of these experiments was to establish the values previously given for lamps of different rated voltages.

As shown in the reply to the inquiry to which I have referred, the burning out of a filament that was not broken when the bulb was destroyed will invariably produce ignition of the gas. The same is true in respect to portable electric lamps, but it has been recognized that, in practice, a blow that would destroy the bulb of a lamp would almost invariably destroy the filament also. However, to guard against the possibility of a filament remaining intact after the bulb of a lamp has been broken, the requirements of the bureau for permissible electric lamps, as stated in Technical Paper 75, p. 6, are that "Permissible portable electric lamps shall be so designed and constructed that under no circumstances can the bulb of a completely assembled lamp equipment be broken while the lamp filament is glowing at a temperature sufficient to ignite explosive mixtures of mine gas and air."

This requirement has led manufacturers of these lamps to adopt a device by which the battery circuit is broken the instant the bulb of the lamp is destroyed. The experiments of the bureau showed that it was possible to smash a miniature bulb without breaking a tungsten filament.

The conclusion is that such a statement as that mentioned in the inquiry, to the effect that "a portable electric lamp will not ignite gas if the bulb is accidentally broken in the mine," is only true in respect to lamps equipped with some form of safety device that will break the current when the bulb is broken. Ignition is almost sure to follow the breaking of a bulb of a lamp that is not so equipped. NOVA.

Montreal, Canada.

Success in First-Aid Work

Letter No. 2—I was glad to read the letter of John T. Bradley, *Coal Age*, Apr. 7, p. 635, and want to indorse what he says in regard to the need of holding first-aid meetings at least once each week. In my opinion such weekly practice would go far toward preventing many mine accidents.

The interest taken by the mine superintendent, foremen and assistant foremen in the weekly meetings will result in securing a good attendance of the men. This has proved to be the case here since the recent change was made in superintendents. The new man has wrought a wonderful difference in the men, and it is quite common to find from 35 to 60 men in attendance at our weekly meetings. Some of the men walk from 1½ to 2 miles and back, which shows the interest they are taking in the work.

Superintendent Murphy aims to make the meetings a benefit to everyone present. He asks questions like, "Does anyone know of any danger in or around the mine that may cause someone to get hurt?" Or, "Has anyone anything to suggest by which the mine and its equipment could be made more safe for work or improved in any way?" These questions generally bring out a good discussion from the men. Much attention is given to first-aid instruction.

It is surprising to observe the interest now taken by men who, but a short time previous, it was not possible to get near the building. Being a first-aid man myself, I have been curious to ascertain the reason for their increased interest in the work.

In answer to my inquiries different ones have told me that the superintendent had explained to them the actual benefit they would derive by attending the meetings regularly. He told them that it would be the means of preventing many serious accidents in the mine. The credit for this work of bringing the men out is very largely due to the interest the superintendent has shown in the welfare of every worker in and about the mine.

Oliphant Furnace, Penn. JOHN H. WILEY.

Furnace Calculations

Letter No. 1—My attention has only recently been called to the article entitled, "Pulverized Coal as a Power-House Fuel," which appeared in *Coal Age*, Jan. 6, p. 16. Not having had any experience in the burning of pulverized coal, I will not attempt to criticize the article in that respect, but want to offer a few brief remarks relating to the author's treatment of the theory of combustion. Some of the statements and calculations made in the early part of the article are, to say the least, misleading. I would also take exception to the extravagant claims made for powdered coal.

Apparently, the author of the article has confused the terms temperature and heat. The word "temperature," in this connection, is significant only of the effect of heat on the firebrick lining of a furnace. On the other hand, engineers understand the term "heat" to describe a certain measurable quantity expressed in heat units (B.t.u.). In the seventh paragraph of the article, referring to Fig. 1, the statement is made that "the available heat would be but 84.5 per cent. of the thermal content of the coal." It is quite evident that this statement refers to the percentage of temperature available, and does not concern what he terms the "thermal content of the coal."

Without going into unnecessary detail, the main point in which the article fails is in being neither wholly theoretical nor wholly practical. For example, in the fifth paragraph the author bases a theoretical calculation of the weight of air required to burn a pound of coal on a practical allowance of 15 lb. of air, which he says is required for the complete combustion of the coal.

Theoretical Analysis of Air Consumption

It is well known that, since the atomic weights of carbon and oxygen are 12 and 16 respectively, and one atom of carbon takes up two atoms of oxygen, 12 lb. of carbon will require 32 lb. of oxygen for its complete combustion, and 1 lb. of carbon will require $32 \div 12 = 2\frac{2}{3}$ lb. of oxygen. Or, since oxygen is 23 per cent., by weight, of normal air, 1 lb. of carbon will require $2\frac{2}{3} \div 0.23 = 11.6$ lb. or, say 12 lb. of air for complete combustion.

This is a purely theoretical analysis and, taking the average specific heat of the products of combustion as 0.25, the weight of these products being the sum of the weights of carbon burned and air consumed, or $1 + 12 = 13$ lb., and since the heating value of a pound of carbon is 14,544 B.t.u., the theoretical rise in temperature is $14{,}544 \div 0.25 \times 13 = 4475$ deg. F., which is a temperature far in excess of what is ever realized in a furnace burning coal. The limit of temperature in such a furnace is about 3200 deg. F.

In practice, it is common to allow an excess of 50 per cent. in air supply, making the weight of air required to burn 1 lb. of carbon, say 18 lb. The temperature attainable when burning coal having a heating value of, say 14,000 B.t.u., with 50 per cent. excess-air supply, assuming an initial temperature of 60 deg. F., would be, practically, $14{,}000 \div 0.25(1 + 18) + 60 =$ say 3000 deg. F. As a fact, there are few furnaces operating on less than 18 lb. of air per pound of coal burned, and the best coal contains impurities, so that a pound of coal does not represent a pound of carbon.

In speaking of the transfer of heat from the furnace gases to the contents of the boiler, in paragraph 10 of the article, the author remarks a drop in temperature of 2000 deg. F., from 2500 deg. in the furnace, to 500 deg. in the breaching; and a drop of 3000 deg. F., from a furnace temperature of 3500 deg. to 500 deg. in the breaching. Unfortunately, however, he ignores the fact that the transfer of heat from the furnace gases to the water in the boiler depends not only on the temperature but on the weight of the gases as well, which in the latter case is 25 per cent. less than in the former.

Considering Increase in Volume of Gases

The reasoning in the next three paragraphs, 11-13, is vague and hard to understand, in respect to its practical application. Speaking of the increased volume due to a rise in the mean temperature of the gases in contact with the boiler heating surfaces, from 1000 deg. to 1500 deg. F., the author estimates the increase in volume on a basis of actual temperature, instead of the absolute temperature, of the gases. Hence, in place of the 50 per cent. increase in volume, there would be an increase of only $100(1500 + 460) / (1000 + 460) = 35$ per cent., nearly.

But, even with this corrected percentage of increase in volume, there is no account taken of the excess-air volume, which would fully offset the increase in volume due to the increase in temperature when excess air is necessary for the combustion. Admitting this is true, practically the same weight of fuel would be burned in each case; and, in view of that fact, the claim in paragraph 14 of "a gain of 20 per cent. in steam output with a consumption of but two-thirds the amount of coal" is absurd.

Permit me to remark that the saving in weight of fuel burned as pulverized coal arises simply from the fact that where this fuel is blown into the furnace with the air necessary for its complete combustion, the distribution of the air brings it into such intimate contact with the fuel to be burned that there is absolutely no waste in the air supply required. Such gain is not to be estimated in the manner proposed in the article to which I have referred. The loss experienced when burning coal with excess air is to be ascribed rather to the greater weight of the products of combustion going up the stack.

A Simple Comparative Estimate

Allow me to suggest the following simple comparison, which applies approximately to the burning of pulverized coal without excess air, and the burning of the same amount of sized coal on the furnace grate with the necessary 50 per cent. excess-air supply, or 18 lb. of air per pound of coal burned. It is as follows:

(a) Burning pulverized coal, with 12 lb. of air per pound of coal, assuming a rise in temperature from 60 deg. F. entering the furnace, to 500 deg. F. in the breaching or at the foot of the stack, which gives $500 - 60 = 440$ deg. F., we have

$$(1 + 12)0.25 \times 440 = 1430 \textit{ B.t.u.}$$

(b) Burning sized coal on a furnace grate, with 18 lb. of air per pound of coal, and assuming the same rise in temperature as before, we have

$$(1 + 18)0.25 \times 440 = 2090 \textit{ B.t.u.}$$

The difference in these results shows that the loss of heat in the stack, in the latter case, is $2090 - 1430 =$

660 B.t.u. per pound of fuel burned. This represents a loss of 100(660/1430) = 46+ per cent. It is readily seen that the greater the excess of air supply required, the greater will be the loss of heat in the stack, while the actual heat per pound of fuel burned passing through the system is the same in each case, assuming an equal quality of the coal burned.

My desire, in writing, has been to draw attention to what most engineers familiar with boiler practice will consider as the fundamental elements in the theory of the combustion of fuel under boilers. There are, of course, many minor factors that enter into the problem, but these always require special consideration in each separate case.

The chief aim in practice, however, is to secure a high furnace temperature with a minimum weight of fuel burned, and the key to the solution of the problem is to reduce the ratio of air supply so as to approximate, as closely as possible, the theoretical amount required for the complete combustion of the fuel.

Undoubtedly, the burning of pulverized coal furnishes ideal conditions for the attainment of this end. It is pertinent to consider, however, whether the cost of pulverizing and drying the coal is greater or less than the saving arising from the increased boiler efficiency and lower cost of attendance. It is of interest, also, to know whether it is more economical to remove the moisture from the coal before or after feeding it to the furnace.

S. W. SYMONS,
New York City. Mechanical Engineer.

Making Up Cartridges in Mines

Letter No. 4—I was much interested in reading the letter on this subject by James Potts, *Coal Age*, Mar. 17, p. 485, and want to say that the suggestion he offers in regard to making up cartridges at home would hardly apply to states like Colorado, where the law restricts the quantity of powder that can be taken into the mine to a day's supply. If miners were permitted to make up their cartridges at home, there would be no check on the quantity of powder they might carry into the mine.

In mines worked with open lights and in which the coal is blasted with black powder, the length of the cartridge should not exceed 12 in. and its diameter 1¾ in. In order to reduce the number of accidents that occur from the careless handling of powder in the mines, all cartridges should be made up by a competent person in the powder house on the surface. Each man, when entering the mine, should be given a sufficient amount of powder for a single day's work. The cartridges should be placed in a suitable incombustible box or can. Where the mine is equipped with electricity the can should be incased in an insulating material so as to avoid accident from possible contact with live wires.

The only condition under which it would appear to be safe for miners to make up their cartridges in the mine is where electric mine lamps are in use exclusively and the miners prohibited from taking any matches, cigars or other means of producing flame into the mine. In my opinion the practice of taking powder into the mine in the keg, as it comes from the factory, should not be permitted under any circumstances.

In reference to the quality of paper used for making cartridges I have found that a good newspaper serves well for that purpose, provided the cartridges are not exposed to moisture after being made up. Where the cartridges are laid by for the use of a shotfirer, they should be protected from moisture by a suitable covering, as otherwise the powder will be unfit for use by the time it is charged in the hole, and the result may prove a misfire.

In regard to cutting the paper on the bias, as suggested by Mr. Potts, it has always been my practice to cut the paper square and with a little soap stick the edge to prevent it from unwinding.

Since the new law in regard to blasting went into effect in Colorado, there has been but one death by explosives in the state in two years. This speaks well for the regulations in regard to the miners making up their cartridges and the work of the shotfirers in charging and firing the holes. ROBERT A. MARSHALL.

Walsenburg, Colo.

Letter No. 5—I was glad indeed to see the discussion started by James Potts, *Coal Age*, Mar. 17, p. 485, in regard to the making up of cartridges in mines. Many a miner is now lying under 6 ft. of sod because of the necessity of having to make up his cartridges from the contents of a keg of powder.

There is, and always will be, much carelessness and neglect in the handling of powder by miners at the working face and, as long as the law permits miners to have access to an unlimited supply of powder in the mines, it must be expected that accidents of this nature will happen.

Like Mr. Potts, I have seen miners make up a cartridge the whole length of a newspaper, which was so weak when filled that it had to be carried to the hole with both hands, and the result was often the loss of one or both eyes of the miner, by the premature explosion of the powder when the cartridge was being forced back into the hole.

It has been the custom in the North of England for miners to make up their cartridges at home, as Mr. Potts says, "by the light of day." I cannot but feel that this practice would eliminate many of the dangers that now attend the making up of cartridges in the mines, in the presence of an open light and live wires.

The cartridges are made up in durable paper, cut on the bias and rolled on a cartridge stick, in the manner already described. These cartridges are placed in what the miner calls a "shotbox," or cartridge keg made of block tin. The shotbox is oblong and will hold three cartridges from 10 to 14 in. in length, there being also a space for squibs.

The practice has given good results. I can remember of but one accident occurring in many years. A large pocket is made on the inner lining of a miner's coat, and in this he carries the shotbox when going to and from his work. No powder is left in the mine at night, which removes a great source of danger.

It is true that the mining laws in some states forbid the carrying of powder into the mine by the miner, especially where the mine is equipped with electricity. But, wherever this prohibition is not in force, I claim that the English practice to which I have referred, if adopted, would result in reducing the number of accidents occurring in mines from this cause.

Poston, Ohio. JAMES H. TAYLOR.

Inquiries of General Interest

Value of Water-Gage Readings

At a recent meeting of the Rocky Mountain Coal Mining Institute, held at Denver, Colo., an interesting discussion was started by the statement made in a paper presented and read before the Institute, entitled "Safe and Efficient Mine Ventilation." The statement was as follows:

> An interesting and helpful feature is that an increase in the reading of the water gage shows the fireboss that there is some impairment to the ventilation in the form of a rock-fall, or empty or loaded cars standing in the airway, or other cause; but a decrease in the gage reading shows the air current has been short-circuited by an open door or other means.

In discussing this question, I stated that the superintendent of a certain mine and myself, aided by mine foremen and firebosses, bratticed off the main return airway of the mine. Our observations showed that, for the same speed of fan, the water-gage reading was the same after erecting the brattice as before. This remark caused somewhat of a sensation, and E. H. Weitzel, who is chairman of the examining board for the State of Colorado, said that candidates for fireboss certificates were usually asked what effect an obstruction in the aircourse of a mine would have upon the water-gage reading. He stated that the correct answer to such a question was generally taken to be that "any obstruction to the free passage of an air current in the mine airways would increase the reading of the water gage."

The result of the discussion that followed was that a committee was appointed, at the suggestion of Mr. Weitzel, to conduct experiments in some of the larger mines for the purpose of proving or disproving the correctness of this answer. The committee appointed consisted of E. H. Weitzel, Pueblo, D. D. Dodge, Cokedale, R. C. Hill, Denver, and myself. I would like to ask that this question be also submitted to the readers of *Coal Age,* in order that we may have the benefit of their experience in this regard.

SAMUEL DEAN.

Delagua, Colo.

We are glad indeed to present this question to the readers of *Coal Age,* who are invited to give their experience as to the effect produced on the reading of the water gage in the fan drift when the air current is obstructed by a roof fall in the airway or by loaded cars blocking the air passages, or other cause whatsoever.

What is wanted is actual practical experience and not opinions, since the general opinion is that any such obstruction to the flow of air must increase the water-gage reading, other conditions remaining unchanged. In reply to the inquiry, we offer the following:

A test of a large Capell fan of the Berwind White Co., at its Eureka mine No. 30, Scalp Level, Penn., Jan. 7, 1898, showed an increase of water-gage reading when the mine was shut off, the fan running at a constant speed of 200 r.p.m. Before cutting off the mine, the gage reading was 3.1 in., and this was increased to 5.6 in. when the airway was bratticed off so as to give what is called a static-gage reading. Under this condition the fan simply churned the air within itself, the fan drift being closed to prevent the passage of air.

A similar test was made of a double-inlet Sirocco fan 8 ft. 6 in. in diameter, at the Alice mine of the Monongahela River Consolidated Coal and Coke Co., Nov. 6, 1910. At a speed of 220 r.p.m., the fan produced a water-gage reading of 4.3 in., which was increased to 5.54 in. when the fan drift was closed to the passage of air.

The Berwind White test of the Capell fan will be found recorded in *Mines and Minerals,* Vol. 18, p. 318. A copy of the test of the Sirocco fan can probably be obtained by writing the American Blower Co., Detroit, Mich.

At a test of a large 28-ft. Beard fan built by the Allis-Chalmers Co., at the Henry colliery of the Lehigh Valley Coal Co., Apr. 25, 1905, a water-gage reading of 3 in. was obtained, at a speed of 75 r.p.m., when the fan was circulating 476,000 cu.ft. of air per minute. The fan drift was then closed as tightly as possibly by the erection of a brattice 25 ft. from the fan and, although some air still leaked through the brattice, the water gage rose to 3.8 in. A measurement taken at the shaft bottom showed that there was a leakage of 113,000 cu.ft. of air through the brattice, which it was feared was not strong enough to be made air-tight, as the total pressure on the brattice would then be over 5000 pounds.

Other tests of a similar nature, and showing like results, might be quoted to prove the generally accepted theory that any obstruction to the free passage of an air current through a mine can only result in an increase of water gage. That a decrease of water gage always accompanies a short-circuiting of the air current is also generally accepted as equally true.

We hope for a hearty response from engineers and other mine officials who have made experiments along this line and can give the results obtained. In the instance mentioned by Mr. Dean, some hidden cause may have influenced the result and prevented the expected increase of water gage.

Estimating Yield of Coal Property

I have a property that lies in the shape of a trapezoid, the long side being 1000 ft., the short side 500 ft. and the perpendicular distance between them 300 ft. If underlaid with a seam of coal 6 ft. thick, having a specific gravity of 1.3, how many short tons of coal could be mined, assuming a recovery of 85 per cent.?

———, Penn.

REALTY.

The area of the trapezoid is $300 \times \frac{1}{2}(500 + 1000) = 225{,}000$ sq.ft. The cubic contents of a 6-ft. seam underlying this property is $6 \times 225{,}000 = 1{,}350{,}000$ cu.ft. For a recovery of 85 per cent., the weight of coal removed from the property is $0.85(1{,}350{,}000 \times 62.5 \times 1.3) \div 2000 = 46{,}617+$ tons.

Examination Questions

Bituminous Mine Inspector's Examination, March, 1917

(*Selected Questions*)

Ques.—Ignoring friction, what quantity of water will be discharged from a 2-in. borehole 4 yd. long under a head of 150 ft. of water?

Ans.—Taking no account of friction, the quantity of water discharged is estimated from the theoretical velocity due to the head, as calculated by the formula, $v = \sqrt{2gh}$, which gives the velocity in feet per second. In this case, $v = \sqrt{2 \times 32.16 \times 150} = 98.2$ ft. per sec. The sectional area of a 2-in. hole is $0.7854 \times 2^2 = 3.14$ sq.in. The theoretical quantity of water discharged from this hole, under the given head, is therefore

$$Q = \frac{3.14 \times 98.2 \times 60 \times 12}{231} = 961 \textit{ gal. per min.}$$

Ques.—(a) What is the manometrical efficiency of a ventilating fan? (b) If the mine resistance is 2½ in. of water gage, the depression at the port of entry of the fan 2 lb. per sq.ft., the area of the port of entry 90 sq.ft., and the area of the port of discharge 65 sq.ft., what is the manometrical efficiency of the fan?

Ans.—(a) By "manometrical efficiency" as applied to mine-ventilating fans is understood the ratio of the effective mine pressure or pressure on the air in the fan drift, to the theoretical pressure calculated from the tip speed of the fan.

(b) This is a question of no practical importance, because it is impossible to measure correctly the depression at the port of entry or the compression at the port of discharge of a fan. It is assumed that these pressures vary inversely as the square of the area of the port, in each case. On this basis, taking the depression at the port of entry as 2 lb. per sq.ft., the compression at the port of discharge is $2(90/65)^2 = 3.8$ lb. per sq.ft. The pressure due to the mine resistance, which in this case is $2\frac{1}{2} \times 5.2 = 11.7$ lb. per sq.ft., is the effective pressure due to the action of the fan, while the total pressure is the sum of the pressure due to the mine resistance and the blowing in and blowing out pressures, or $11.7 + 2 + 3.8 = 17.5$ lb. per sq.ft. The manometric efficiency is

$$K = \frac{11.7 \times 100}{17.5} = 66.8 \textit{ per cent.}$$

[Such a question ought never to be given in a practical examination, and the following is another.—Editor.]

Ques.—From the following data, find the theoretical water gage: A fan driven by two coupled engines having cylinders 18 in. in diameter, length of stroke 42 in., number of strokes per minute 50, with 16.8 lb. mean pressure per square inch, develops an indicated horsepower of 80, circulating 144,055 cu.ft. of air per minute and gives an actual water gage reading of 3 inches.

Ans.—It is impossible to obtain any intelligent meaning of this question. In the first place, the two engines together, estimated from the data given, would only develop about 45 hp. Thus, for a stroke of $42 \div 12 = 3.5$ ft., the horsepower of the two engines is

$$H = \frac{2plan}{33{,}000} = 2\left(\frac{16.8 \times 3.5(0.7854 \times 18^2)50}{33{,}000}\right) = 45+ \textit{ hp.}$$

The horsepower on the air, calculated by multiplying the quantity of air in circulation by the unit pressure and dividing by 33,000, is $144{,}055(3 \times 5.2) \div 33{,}000 = 68+$ hp. The two engines of the given dimensions are incapable of producing even this and much less 80 hp., and we know of no way of estimating what could be called the "theoretical water gage."

[It is a reflection on an examining board to ask such a question as this, which cannot be answered.—Editor.]

Ques.—The quantity of air required per minute in a mine is 100,000 cu.ft.; depth of shaft, 600 ft.; water gage, 1½ in.; and temperature of the outside air, 60 deg. F. The fan engine consumes 5 lb. of coal per horsepower-hour. The specific heat of air being 0.2374 and the units of heat per pound of coal 12,000 B.t.u., which is the most economical method of ventilating this mine, by a fan or by a furnace? Explain fully.

Ans.—A water gage of 1½ in. corresponds to a pressure of $1.5 \times 5.2 = 7.8$ lb. per sq.ft., which is the difference in weight between the upcast and the downcast columns of air, each of which is 600 ft. in height. The difference in weight per cubic foot of air is therefore $7.8 \div 600 = 0.013$ lb. But, 1 cu.ft. of outside air at a temperature of 60 deg., assuming a barometer of 30 in., is

$$w = \frac{1.3273 \times 30}{460 + 60} = 0.0766 \textit{ lb.}$$

The weight per cubic foot of upcast air, in this case, must therefore be $0.0766 - 0.013 = 0.0636$ lb. Again, taking the barometer as 30 in., the temperature of the upcast air to produce this weight per cubic foot is

$$t = \frac{1.3273 \times 30}{0.0636} - 460 = 166 \textit{ deg.}$$

The weight of air passing into the mine per hour is $60 \times 100{,}000 \times 0.0766 = 459{,}600$ lb. The outside temperature being 60 deg., the rise in temperature, due to the furnace, is $166 - 60 = 106$ deg. Then, since the specific heat of air, for constant pressure, is 0.2374 and the heat per pound of coal is 12,000 B.t.u., the weight of coal burned per hour in the furnace is $459{,}600 \times 0.2374 \times 106 \div 12{,}000 = 964$ lb., nearly.

To ascertain the weight of coal burned in the operation of the fan, it is necessary to assume the efficiency of the fan and engine as, say 60 per cent. The horsepower on the air is $100{,}000 \times 7.8 \div 33{,}000 = 23.6$ hp. For an efficiency of 60 per cent., the horsepower required to drive the fan is $23.6 \div 0.60 =$ say 40 hp. Since the engine consumes 5 lb. of coal per horsepower-hour, the total weight of coal burned per hour, in operating the fan, is $5 \times 40 = 200$ lb. It is therefore cheaper to ventilate the mine by a fan than by a furnace.

Book Reviews

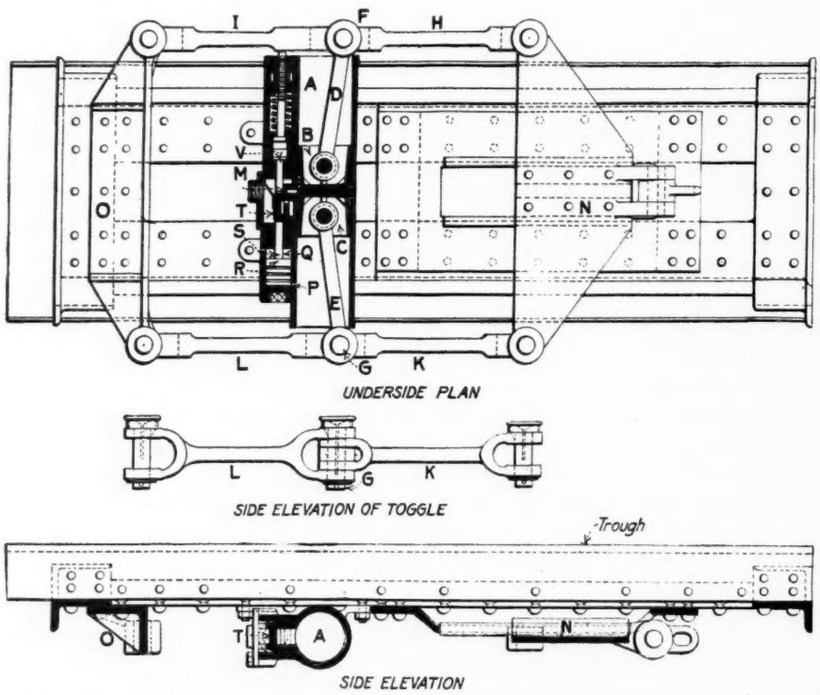
Compendium of Conveyor Information

THE MECHANICAL HANDLING AND STORING OF MATERIAL: A Treatise on the Handling and Storing of Material Such as Grain, Coal, Ore and Timber by Automatic or Semiautomatic Machinery, Together with the Various Accessories Used in the Manipulation of Such Plant—By George Frederick Zimmer. Pages xiv + 728 + 15 index; 7¼ x 10⅜ in.; 1044 illustrations, mostly line cuts. D. Van Nostrand Co., 25 Park Place, New York City, publisher. Cloth boards. Price, $12.50 net.

A wonderfully complete book, by a British engineer, on the handling and storing of material. It has recently been revised, and noticeable among the parts brought up to date are the articles on coal-face conveyors, the handling of coke from coke ovens and the handling of coal by pneumatic and hydraulic means.

The face conveyors are divided into four types. One consists of appliances in which the coal is carried in small receptacles, or buggies, running back and forth on rails in front of the face.

It is not a conveyor in the sense to which we are prone to restrict that word, for the buggies are moved along the face and back again by reversing the direction of motion. They are merely cars of small size strung one behind the other. In some cases they are built for such close contact that no ends are needed, and a lump of coal can rest partly in two consecutive buggies.



FLOTTMANN JOGGING CONVEYOR, WHICH JOLTS COAL FORWARD AS STRAPHANGERS ARE PROJECTED FORWARD IN A STREET CAR

In this reciprocating class are the Mickley, Bothwell, Bunker, Cummings & Gardiner, Walton & Rayner, Thomson and Gibb conveyors. The conveyors are unloaded by the opening of slides, by the operation of automatic tipping devices, or by the action of the upper strand of a textile band that rests on the segments, or buggies, and is set in motion when the train of conveyor segments is in the unloading position at the gateway or haulage road.

Another class are real conveyors with the coal taken on an endless movable band. The best-known type is that of Richard Sutcliffe, of Wakefield.

To quote the author, "For the band itself hemp or flax is most serviceable. Jute cotton and the bass of the ancient lime tree are also used, but they do not last as long as hemp or flax. Occasionally woven wire bands are employed. All textile bands suffer much from the damp atmosphere of the mines, and to avoid this they are impregnated with various substances such as balata [Surinam gutta percha from the West Indies and South America]. Tar is also used for this purpose.

"The width of the band varies between 20 and 24 in. Up gradients of 5 per cent. and down gradients of 12 deg. are within working limits. The advantage of these belt conveyors is their suitability to an uneven floor, for the band can accommodate itself to the unevenness of either floor or roof. The power for driving them is considerably less than for other appliances, and the working is both noiseless and dustless, which is of great importance.

"The disadvantages are the great wear and tear caused not only, as already mentioned, by the atmosphere, but by improper erection also. These conveyors, like all others used for this purpose, constantly have to be removed and reërected near the receding face, and the reërection does not always get the care that is necessary to insure that all idlers are at right angles to the band and parallel to each other.

"Consequently, the band travels with a snake-like side motion, and as a result the edges are injured and frayed by contact with other objects. The loading is not so easy as with other conveyors, and it is complained that coal occasionally drops off the band. As a last objection they are quite unsuitable to wet mines." There is another class of conveyor that has a fixed trough over which chains or scrapers pass. The Blackett is the oldest and best known of this type. Other makes are the Greaves, the Vinton and the Ritchie & Sutcliffe. The Allardyce conveyor has an endless chain that draws the coal along a trough in the floor. The chain returns above, being supported at 9-ft. intervals. Lastly, there is the class that has been so popular in German collieries—the Rutsche class. The author favors the use of "jog-trough" as an expressive English equivalent of this name. The material is passed along by a jerking, or jogging, motion of the trough. There are several types—Carlshütte, Flottmann, Würfel & Neuhaus, Eickhoff, Degenhard and Hinselmann. The cost of loading with them is said to be 5c. a long ton, including driving power, wear on motor, lubricant, repairs, cost of erection and reërection. The Flottmann mechanism is illustrated herewith; the description is taken from the text of the book under review, but with explanatory letters added. "The cylinder A is open at both ends, and in it move two pistons B and C connected by rods D and E to the junctions F and G, of two pairs of toggle levers, HI and KL. The illustration represents the two pistons at the beginning of their cycle of movement—that is, close together and with the port M open for the admission of compressed air; the pistons B and C are now forced apart, and with them the toggle levers N and O.

"This action forces toward each other the two impulse brackets, to which the other ends of the toggles are joined; and as one of these brackets is anchored by a chain to the ground, and the other is bolted to the conveyor trough, the latter is forced to make its up-stroke. The air in the cylinder is now allowed to escape, and the weight of the trough acting through the toggles forces the pistons back to the first position.

"The working of the gear is as follows: As the pistons are being forced apart and nearly reach the end of the stroke, one of them uncovers a port P leading to a small auxiliary cylinder Q with piston R, rod S and slide valve T, the latter at the extreme end. As a portion of the air enters now behind the piston R the slide valve T is pushed forward and cuts off the port M by which air is supplied to the main cylinder.

"The movement of the slide valve at the same time pushes out a rod V at the opposite end, and when the weight of the trough completes the return stroke one of the collapsing toggle levers I pushes this rod back again at V and thereby reopens the inlet M for the compressed air, at the same time pushing the small auxiliary piston R back to its first position. The impulse bracket, which is anchored by the chain, is guided by a sliding block and groove fixed to the conveyor trough to insure that the movement of the toggle levers will be symmetrical."

The author concludes his interesting reference to face conveyors for coal workings in the following words:

"Belt and scraper conveyors require less driving power than reciprocating trough conveyors (Rutschen). In other respects they are about equally serviceable, but the latter are generally of a lower initial cost. Concerning the respective merits of Rutschen, those suspended on chains or links are more difficult, and therefore more costly, to move with the face; they depend on the timbering, and their use is restricted to seams of certain limits.

"Those of the type with independent trestle supports are more costly still in labor for moving, and also share the restrictions as to size of seam with those previously mentioned; but they have the advantage of being independent of the timbering of the mine.

ROLLER CONVEYORS ARE PREFERABLE TO OTHERS

"Those supported on rollers are the least expensive and simplest to move, are independent of the timbering, and are applicable to even the smallest workable seams. From the foregoing it appears likely that conveyors of the roller-supported type will soon become as popular in this country [Great Britain] as they are already on the Continent, where they are very largely used."

The author discusses elevators, worm or archimedean screw conveyors, push-plate or scraper conveyors, push-trough conveyors, band conveyors, steel-plate conveyors, slat conveyors, picking belts, continuous trough conveyors, vibrating or reciprocating trough conveyors, gravity bucket conveyors, driving power, speed and wear and tear of elevating and conveying machinery, handling hot coke in gas works, casting machines, conveyors for special purposes, tightening and equalizing gears for elevators and conveyors, gravity conveying, automatic feeding devices, pneumatic and hydraulic conveying, disposal of ashes from steamers, endless rope and chain haulage, ropeways, aërial cableways or cable cranes, coaling at sea, monorails and telphers, blast-furnace conveying work, handling coke from coke oven, including quenching devices, discharging by skips and grabs, transporters, bridge or cantilever cranes, unloading vessels by barge or ship elevators and marine legs, floating loading devices, including self-emptying barges, unloading by specially constructed self-emptying hopper wagons, unloading railroad wagons by tips or hoists, colliery tips or tipplers, loading coal into ships without tips, miscellaneous loading and loading devices, coaling railway engines, coal, coke and ash-handling plants for boiler houses, gas works, etc., storing coal and other minerals in stock heaps and silos, warehousing of grain, automatic weighing of material and weights of various materials.

Use of Clay and Shale from Coal Mines

TESTS ON CLAY MATERIALS AVAILABLE IN ILLINOIS COAL MINES. Bulletin 18. Coöperative Coal Mining Series. By R. T. Stull and R. K. Hursh, Ceramics Department, University of Illinois. Pages 129 + 2 index; 6 x 9 in.; several illustrations and charts. Illinois State Geological Survey, Urbana, Ill. Paper boards.

A careful study, with illustrated charts, of some of the clays in Illinois coal beds is this latest bulletin of the Illinois Coal Mining Investigations Commission. Some of the statements contained in the report may well be abstracted for this review.

The bulletin says that it is not advisable to install a modern brick plant equipped with a permanent dryer and kilns for a daily capacity, of less than 10,000 to 15,000 brick, though a yard of smaller capacity might profitably be built where the clay produces a high-grade product. It is said that a plant costs about as many dollars in initial outlay as it will make bricks per diem. Thus, a $15,000 plant will roughly make and burn 15,000 brick a day. A thousand brick require about 2 cu.yd. of clay.

Sampling must be done carefully, for clays are "mixtures of minerals" and vary considerably from point to point. So, in sampling, not merely a single vertical cross-section should be taken, but clay from various parts of the clay bed. The clay taken near the outcrop should not be regarded as a sample, as the material near the surface of the ground has been more or less purified by the breaking down of mineral matter and by the leaching out of soluble salts by the rain.

Weathered shale may give excellent results, while the unweathered material may prove very troublesome. The worst feature in sampling, therefore, is that shale and clay, like coal, can most easily be obtained near the crop. Contrary to the experience with coal, however, the best sample of shale and clay is apt to be the crop sample, but success with this weathered material should never be taken as evidence of the value of the deposit. Laboratory investigations also must be regarded with some question, for the physical behavior of clays and shales under factory conditions cannot be duplicated closely in a laboratory.

STIFF-MUD CLAY NEEDS MEDIUM PLASTICITY

The method of working the clay depends on its character. The rather plastic surface clays are suited to the soft-mud process, whereas the stiff-mud process is that indicated for the manufacture of brick from shales. The clay to be treated by a stiff-mud process must not be too plastic nor too short.

It must have bonding strength enough—that is, be plastic enough—to withstand the strains produced in passing through the die of an ordinary brick machine, or the issuing column is likely to be rough or torn and frequently cracked. On the other hand, if the clay is too plastic, the column that issues from the die will laminate and tear at its corners. Moreover, such plastic clays are likely to shrink overmuch and will warp and crack unless dried very carefully.

Of course, the higher grade brick for the fronts of dwellings and public buildings or for paving purposes should have this desirable medium plasticity in even more uniform and desirable degree. Clays for hollow ware and fireproofing need a greater degree of plasticity in order that they may be molded properly. They must also dry without shrinking.

Clays that contain large amounts of carbon, pyrite, or ferrous iron, or that become dense at low temperatures and which, therefore, greatly retard the process of oxidation, may be regarded as unsuitable for manufacturing purposes. The oxidation tests made in the Illinois Coal-Mining Investigations show the comparative ease or difficulty of burning the various samples at low temperatures and the relative danger of bloating due to incomplete oxidation. Clays that are completely oxidized in a few hours should give no great trouble in burning, but those that show, as some did, a black core of considerable size at the end of the 10-hour period may well be eliminated as commercial possibilities for any kind of ware.

But some clays have the property of remaining porous at temperatures well above those usually sufficing for oxidation, and do not vitrify. Ground coal is actually added to some of these clays to aid in burning the ware, but in such cases only common brick of a porous nature can be made.

PITTING, SCUMMING AND BLOATING OF CLAY WARE

Pitting due to granules of iron compounds or arising from the slaking of lime lumps in the burned clay, when it is exposed to a moist atmosphere, is not desirable in any ware, and the clay that has these defects can only be used for common brick or hollow tile. The iron compounds that cause pitting are pyrite and iron carbonate. Granules containing mixtures of calcium and iron carbonate are also found. These iron compounds "pop out" from expansion during the oxidation period, which occurs at or above 700 deg. C., and leave a black hard grain exposed. Some of the resulting granules in the experiments were strongly attracted by a magnet, indicating the presence of magnetic oxide of iron (Fe_3O_4). But after the product was left in the kiln for some time, the granules lost their magnetic quality.

One part of calcium sulphate will dissolve in 40 parts of water. If that salt be present in the clay, it is dissolved and carried to the surface of the ware during drying and deposited as a scum or efflorescence. The salt will not burn off, and the result is a scummy product. A little barium, as carbonate, hydrate, chloride or fluoride, may be added, and it will prevent the formation of scum if it is not excessive. The scum may be burned hard enough so that it will fuse with the clay and become unobjectionable.

Bloating may occur before or after oxidation. That bloating which occurs after the clay is oxidized may result from the evolution of occluded gases, the volatilization of some constituent of the clay or from gas evolution caused by dissociation, such as the evolution of sulphur dioxide by the reduction and dissociation of a sulphate. Such clay is said to be overfired. The bloating may occur before, during or after vitrification.

The bulletin needs no commendation, as it is part of the excellent series of coal treatises that the University of Illinois is publishing. It is a pity that these excellent monographs are not receiving a national circulation.

Coal and Coke News

Washington, D. C.

Pending an investigation into the reasonableness of the proposed change, the Interstate Commerce Commission has suspended until Aug. 13 freight tariffs providing for a reduction in the free time allowance on bituminous coal and coke from various producing points to Lake ports for transshipment by vessel. Under the present rules 5 days' free time is allowed. The proposed allowance is 4 days' free time. The roads which proposed the change are the Baltimore & Ohio; Bessemer & Lake Erie; Buffalo, Rochester & Pittsburgh; Cincinnati, Hamilton & Dayton; Hocking Valley; New York Central; Pennsylvania; Toledo & Ohio; West Shore; and the Wheeling & Lake Erie railroads. The Commission has also suspended until Aug. 8 next freight tariffs providing for a reduction in the free time on anthracite and bituminous coal held for transshipment by water at Eastern tidewater points. At present the tariffs of the railroads provide for 10 days' free time under straight demurrage plan and 5 days' free time under the average agreement plan. The proposed tariffs would reduce the free time allowance to 6 days on straight demurrage and 3 days' free time under the average agreement plan.

This change was proposed by the Baltimore & Ohio; Central of New Jersey; Delaware, Lackawanna & Western; Erie; Lehigh Valley; New York, Ontario & Western; Pennsylvania; Philadelphia & Reading; Staten Island Rapid Transit; and the Western Maryland railroads. The Commission will conduct an investigation into the reasonableness of the proposed change.

For a like reason the Commission has suspended until Oct. 14 the following proposed advances in coal rates: A tariff of the Norfolk & Western R.R. proposing increased rates on coke, carloads, from producing points in the Pocahontas, Tug River and Clinch Valley districts to Lawrence, Ohio. A tariff proposing to withdraw the joint through rates on bituminous coal, carloads, from mines on the Pittsburgh, Cincinnati, Chicago & St. Louis R.R. and the Pittsburgh, Chartiers & Youghiogheny Ry. in Pennsylvania and West Virginia to various destinations on the Erie and other Eastern roads. A tariff of the El Paso & Southwestern System naming increased commodity rates on coal, carloads, from Dawson, N. M., to various destinations in Texas.

The Commission also suspended until Oct. 23 next a tariff of the Atchison, Topeka & Santa Fe and other railroads proposing increased rates on coal, carloads, from Gallup, N. M., to various destinations in Arizona.

HARRISBURG, PENN.

W. W. Atterbury, vice president in charge of operations of the Pennsylvania R.R., testified before the State Public Service Commission on Apr. 12, upon the complaint of the bituminous coal operators of the Clearfield district against a redistricting of the state by the Pennsylvania. The Clearfield operators asserted that the action of the railroad in combining the Westmoreland and Pittsburgh zones in effect raised their freight rates 15c. a ton.

Mr. Atterbury announced in view of the unusual expense borne by the railroad there could be no reduction in the existing freight rates. The increase in expenses for the present year, he said, would total more than $25,000,000, due to the operation of the Adamson act, other advances in wages, cost of fuel, materials and supplies and taxes. The losses for the first two months of 1917 were given as $2,600,000.

Other roads were represented at the hearing, these being the New York Central, the Baltimore & Ohio and the Western Maryland, George S. Patterson, attorney for the Pennsylvania, was the chief counsel for the roads. C. Andrade, Jr., of New York, representing the Connellsville operators argued for a dismissal of the case on technical grounds, but was overruled.

The railroad people argued that the railroads should be placed in the strongest possible physical condition to meet extraordinary demands which probably will be placed upon them by the country for the handling of the existing business and the additional traffic, due to the movement of troops and supplies. In view of these conditions it is evident that no reduction consistently could be made in existing freight rates, but they stated that there should be an increase in such rates to enable the railroads to meet the largely increased expenses of operation which will be incurred in the future and to provide necessary improvements for handling promptly and efficiently the increased business.

Until the situation with Germany became critical, the leaders of the Legislature had prepared for introduction some feasible revenue-raising bills, among them being a tax on both anthracite and bituminous coal, the passage of which would permit larger appropriations to worthy state and semistate institutions. But the declaration of war with Germany has meant the abandonment of the new revenue-raising program for the present for the reason that the national Government is going to tax everything loose and it would be a hardship on the people for the legislature to follow with additional taxes. The results are that the bills now before the house to tax the coal output of the state may be dropped for the time being.

A bill to provide for the safeguarding of the lives of employees in both anthracite and bituminous regions was recently presented in the House of Representatives to have all electrical equipment installed in such a way as to minimize to the utmost the dangers attending its use.

The bill was drawn by the chief of the Department of Mines and will be backed in both houses by the friends of the administration. It is stated that the bill is the outcome of the recent gas explosion at the Robindale mine of the Conemaugh Coal Co. in Cambria County, which it is alleged was caused by a spark from a trailing cable, and that some legislation should be enacted regarding the installation of electricity in mines, not to prohibit its use, but its misuse.

Chief James E. Roderick of the Department of Mines had the bill drawn under the advice and assistance of the consulting electrical engineer of the Department of Mines.

A bill to permit owners of surface property to institute suit for damages by reason of surface subsidences was introduced in the house on Apr. 12, by Representative West, of Montour County.

The West bill provides that action for damages for failure to maintain support, both vertical and lateral, for lands and buildings, may be brought within six years from the time when damage or injury caused by such failure becomes openly visible on the surface of the property damaged or injured.

Mr. West explained that the bill had been given to him to present by Attorney James S. Scarlet, special counsel for the Scranton Surface Protective Association. Its purpose, Mr. West explained, is to establish to owners of protected property, the right to recover damages, but it also is figured to be a tactical move to learn the sentiment of the house on mine cave remedial legislation.

Mine foremen and assistant mine foremen certificates were recently denied to 32 men from Luzerne County because they took the examination in districts outside of those wherein they were employed.

It is the rule of the Department of Mines and this rule has been followed by the examining boards that applicants should appear before the board in the district where they are employed. This rule has always been printed and posted where applicants can see it.

As a result of the action by Chief Roderick, mandamus proceedings will be instituted shortly in the Dauphin County court in this city to compel the certification of the applicants in question.

The chief of the Department of Mines states that the applicants, whose certificates have been refused, disobeyed the rule as laid down by the Department, and before withholding the certificates he consulted the proper legal authorities as to his proposed course and they indorsed and commended his action. He stated further, that designing men cannot force him to do an act he knows to be wrong in practice and principle.

The militia reserve force that Governor Brumbaugh desires should be organized in Pennsylvania is not to be formed because of any fear that labor disorders may make such a force necessary. The Governor has placed insistence upon that point. In the first place, the state administration has already received personal assurances from a majority of the labor leaders in the state that "labor is prepared to do its bit."

In the second place the state committee of safety is, among other things, charged with the general duty of stepping in as mediator in any troublesome situation that may arise. The Governor plans in the near future to issue a general proclamation to employers and employees in this state in which he will place stress upon the patriotic duty that each and every one of them owes the commonwealth and the nation.

PENNSYLVANIA

Anthracite

Pittston—The Stars and Stripes now waves over practically every coal mine in upper Luzerne County. With the nation at war, flag raisings became the order of the day at the different mines until now there is probably not a mine in Pittston and its vicinity from which the colors do not float. Leading officials of the coal companies have lent their services to the flag raising exercises as speakers, as have local dignitaries. It is noteworthy that most of the flag-raising movements started with the men and at many of the mines the flag fund was contributed by them. Thousands of aliens or new Americans have caught a patriotic inspiration from the demonstrations of loyalty.

The Pennsylvania Coal and the Hillside Coal and Iron companies have announced their willingness to permit employees to cultivate company land for gardens, rent free, wherever practicable and numbers of applications for the privilege have been granted.

Frackville—The Mahanoy plane was put out of commission for some time when the main shaft of the 2000-hp. hoisting engine broke in two places on Apr. 12. Five loaded battleship coal cars were just about to be hoisted over the "knuckle" of the plane when the accident occurred. The cars started back down the plane, but were held by the "barney." It required six railroad engines to haul each battleship car separately over the "knuckle." All the collieries north of the Broad Mountain had to suspend for want of railroad cars due to the accident thus throwing thousands of miners idle. The loaded coal and empty cars will be hauled via Bear Run Junction, to Frackville, Mahanoy and Tamaqua Tunnels, until the plane is repaired. This will necessitate the employment of many new crews, putting the company to great expense. An average of 900 railroad cars was hoisted over the plane daily.

Dupont—Traffic on the Moosic and Pittston street-car line was affected on Apr. 12 by a mine cave near the Du Pont station of the Laurel Line. The settling extends over a distance of 200 yd. Besides injuring the car tracks it also damaged several properties.

Wilkes-Barre—The Susquehanna Coal Co. announced on Apr. 12 through Robert A. Quin, general manager, that hundreds of acres of land surrounding the 14 collieries of the company in the anthracite field will be given over to be cultivated and planted. The gardening will be conducted on a big scale and a campaign to encourage it has been started by the officials of the company.

Shipments of anthracite from the collieries last month established a new record with a total of nearly 7,000,000 tons. The total was 6,988,075 tons, an increase over February of 1,810,643 tons or 35 per cent, and over March, 1916, of 861,724 tons or about 14 per cent. The highest record previously made was in October, 1915, when 6,683.007 tons were shipped.

Bituminous

Johnstown—This city has been chosen as the headquarters for another bituminous mining district. State Mine Inspector C. H. Crocker, formerly located at Blairsville, has been transferred to this city. There are now four mine inspectors with headquarters in Johnstown, T. D. Williams, Nicholas Evans and Mr. Crocker under the jurisdiction of the state Department of Mines and Malcolm McDougal, in charge of the inspection work for the state Insurance Fund.

Mayor Franke has issued instructions to City Solicitor Tillm K. Saylor, of this city, to notify Harry A. Hager to remove the coal tipple at his mine in Moxham which is built over the tracks of the Johnstown Traction Co. The tipple spans the tracks from the mine mouth to the tracks of the Johnstown & Stony Creek R.R. and was erected without the consent of the city authorities.

The Knickerbocker Smokeless Coal Co., of New York, has opened an office in this city to better care for its interests in this section. The company has several mines in Somerset County.

The greatest number of applicants for the mine foremen and fireboss certificates in this region sat at the examinations which were held in the Vigilant Fire Co. hall recently. Inspectors Williams of the 6th district, Evans of the 24th and Crocker of the 30th, together with their various assistant board members had charge of the examinations.

Punxsutawney—There were 27 candidates for mine foremen and 14 for fireboss certificates in the 12th district; 14 for mine foreman and 8 for fireboss in the 28th district. The examinations were conducted here last week with Mine Inspectors Furniss and Thompson at the head of the respective boards for examination.

The new operations of the Janeau Coal Mining Co. at Janeau, Indiana County, has been purchased by Dr. Daniel Ritter and others of this city. The deal covers the large tract of coal owned by the company and all buildings and other improvements on the property. Switch connections are being made to the B. R. & P. Ry.

Connellsville—There were 32 applicants for certificates as mine foremen at the examination

of the Ninth Bituminous District which was conducted here recently. The examining board consisted of P. J. Walsh, of Connellsville, inspector; John W. Greaves, Sr., of Dunbar, representing the operators; and James Conway of Trotter, representing the miners.

Pittsburgh—The committee which formulated the questions for the examinations of mine foreman and fireboss which were held in the various districts last week, met at the Seventh Avenue Hotel here on Monday and Tuesday, Apr. 16 and 17 to prepare the answers for the questions asked, which will be printed and forwarded to the various examining boards when the papers will be corrected. The committee comprises: Fletcher W. Cunningham, of Somerset, and Thomas S. Lowther, of Indiana, state mine inspectors; James Henderson, of Dravosburg, James W. Buckwalter, of Pittsburgh, as operators' representatives; John Walters, of Westmoreland City, James Conway, of Connellsville, as miners' representatives.

Uniontown—J. D. Stringer, of Uniontown, and Charles Rhodes, of Springhill township, recently cleared $21,950 on 72 acres of coal land purchased the same day it was sold. In the morning they purchased the land from the Ada Coal and Coke Co., for $23,050 and two hours later sold the same tract to Harry S. Scheibler, of Greensburg, for $45,000. This land is located in Cheat Haven, on the Baltimore & Ohio R.R.

WEST VIRGINIA

Fairmont—A new mine is being opened on the line of the Western Maryland R.R. near Worthington, by the Salvatore Coal Co. This mine will be equipped with modern electrical machinery throughout including an electric haulage system. The output is expected to average 500 tons per day after the mine has been developed. The Salvatore Coal Co. has only recently incorporated for $25,000. It has some other mines under development.

Bluefield—The coal business throughout the Clinchfield territory is the best ever known. The upper and lower Banner seams are being developed rapidly at Toms Creek, Bruce, Russells Creek and Coeburn. The Virginia Iron, Coal and Coke Co., at Toms Creek, is rapidly developing its mines at Dale Ridge and near Bondtown and Coeburn. This firm has in this vicinity a territory of approximately 3 mi. square. Something like six new mines will be opened, giving employment to several hundred men. The Kilgore Coal Corporation is also making rapid developments, increasing the output to more than double in the past 30 days. This company has about 75 acres of the Upper Banner seam and 125 acres of the Lower Banner seam and 200 acres of the Imboden seam. This is said to be one of the nicest little operations on the Clinch Valley.

ALABAMA

Birmingham—The announcement of the U. S. Steel Corporation of an increase of 10% in the wage of all employees receiving less than $2500 per annum, effective May 1, will affect several thousand men in the local subsidiary of the corporation, the Tennessee Coal, Iron and Railroad Co. It is understood that all of the larger mining companies in this district have for some time had under consideration increased compensation for their employees either through the medium of an advanced wage scale or by means of some form of bonus system, and some definite decision will be arrived at shortly.

Chief Mine Inspector C. H. Nesbit has just completed the compilation of the coal and coke production of Alabama for 1916, showing a total coal output of 18,234,625 net tons, and a total coke production of 4,385,493. In 1915, 15,266,831 tons of coal was produced and 2,958,062 tons of coke was manufactured.

Gadsen—D. B. Gore & Co. is developing a surface mine at Tate's Gap, near Gadsden, the property embracing about 1000 acres of Phillips or Lost Seam coal. The output will be about 500 tons per day.

KENTUCKY

Jeff—The Kenmont Coal Co. is making increases in its plant, and will about double the present output within 10 days. This is a new company in the field, having begun shipping about 30 days ago. It is developing the Buffalo section.

Harlan—Coal miners throughout the Harlan field will be urged to put out every available foot of ground into garden vegetables this spring, in order to reduce as much as possible the high cost of living. The miners, who have been experiencing the unusually high cost, will make every effort possible to raise a quantity of potatoes, beans, etc., for home consumption. The same conditions prevail over the whole of the eastern Kentucky coal fields.

Winchester—One of the results of the oil boom in Estill and surrounding counties, it is said here by capitalists who have invested in those lands, will be an increased development of the coal producing lands in that part of eastern Kentucky. On numbers of the holdings which have been leased for the prospecting for oil it is stated that coal is prominently indicated and that whether oil in commercial quantity is found, or not, the coal will be developed.

Hazard—Survey of a new railway line into various parts of the Lotts Creek territory adjacent to Hazard is nearing completion and several contractors are preparing to bid on construction work. This will involve construction of from eight to 10 miles of road, and will mean an addition of at least a half dozen new operations.

John B. Eversdale and A. S. Petrey have purchased a small tract of coal land belonging to Wayne Walker and taken a lease on a holding adjoining preparatory to opening a mine which will deliver its output to the Louisville & Nashville R.R. This is one of the last of the small pieces of coal land in this vicinity and carries fine No. 4 coal.

West Frankfort—No. 8 mine of the Old Ben Mining Co., one of the largest in the state, has been made idle on account of one of the boilers blowing up, killing a fireman.

Frankfort—Kentucky coal will not be assessed with a tonnage tax, it is now believed, as a result of the prompt knock-out of the tonnage tax bill of Representative D. J. Howard when it was up for consideration on the floor of the House on Apr. 13. Refusing even to consider amendments to this measure, the House tabled the bill by a vote of 48 to 42, thereby killing it. It provided for a 2c. tonnage tax on all the coal produced in the state, and although there are various other measures, one providing for a 1c. tax, one for a 5c. tax, etc., it is considered now to be certain that they will meet the same or a similar fate. The Howard bill contained a tax on oil and natural gas but it was the provision as to coal which was opposed.

INDIANA

Bicknell—William H. Hays recently purchased 1000 acres of coal land from Chas. A. Phillippe and others. This land is near the Oliphan-Johnson mine. Several hundred acres it is anticipated will be sold soon.

ILLINOIS

Springfield—Superintendent Richard Neeson of the Sangamon County Mining Co., has announced that the first five employees of the company who enlist will be paid $12 a week by the company as long as the war lasts. After the five have enlisted another proposition will be made to other employees. If an employee is incapacitated in service he and his family will be compensated by the company.

Murphysboro—High water in the Big Muddy River has caused a suspension of work at mine No. 9 of the Big Muddy Coal and Iron Co. The company will take no chances on the 300 men employed in the mine when the water gets high. The workings are under the bed of the river.

Carlinville—A. W. Crawford and his son, A. M. Crawford, have obtained leases on thousands of acres of coal lands in Macoupin County, practically all the acreage that had not been sold. A new coal field is being opened in the county. Drill tests on the Crawford holdings will begin at once. A force of examiners will be employed to look after the titles to the lands. The Crawfords four years ago promoted a deal by which 25,000 acres of coal lands were sold to the Illinois Union Coal Co.

Personals

Cecil Harrison, mining engineer for the Clinton Coal Co., has returned to work after an illness of several weeks.

C. H. Roberts has been appointed comptroller of the Hess-Bright Manufacturing Co. He was formerly factory accountant.

H. I. Smith, the district engineer of the Bureau of Mines, in charge of the Urbana, Ill., station, has resigned to accept private employment.

Michael Marks has been chosen as superintendent of sales and construction for the Pioneer Electric Mine Lamp Co., of Philadelphia, Penn.

John Douglas, superintendent at Mine No. 1 of the Louisville Coal and Land Co. has been appointed general superintendent for the same firm.

C. G. Evans has resigned as manager of the Elkhorn & Shelby Creek Coal Co., Esco, Ky., and has opened a mining engineering office at Pikeville, Ky.

C. T. Winkless has been appointed superintendent of fuel for the Chicago, Rock Island and Pacific Railway Co., in charge of the purchase, distribution and handling of fuel.

Everett Drennen has become associated with the West Virginia Coal and Coke Co. as vice-president and general manager. Mr. Drennen will have headquarters at Elkins, W. Va.

William Scott, who has been superintendent of the Walston mines of the Rochester & Pittsburgh Coal and Iron Co., has been made superintendent of the Eleanora mines of this company.

John R. Caldwell, who has been prominently identified with the Berwind-White Coal Co., at Windber, for several years, has been retired with full salary. He now resides at Indiana, Penn.

John Rudolph, assistant superintendent for the Rochester & Pittsburgh Coal and Iron Co., at Eleanora mines, has been made superintendent of the mines of this company at Walston, Penn.

James H. Pritchard, labor and compensation commissioner of the Southern Ohio Coal Exchange, attended the conference of operators and miners of the four states agreement at New York recently.

J. F. Sharpe has resigned as manager of the Hailey-Ola Coal Co. at Haileyville, near McAlester, Okla., and has accepted a position as manager of the Carter Coal Co. at Bluefield, W. Va.

Lew G. Hastings, of Patton, Penn., mining engineer for the Pennsylvania Coal and Coke Corporation, has resigned his position to accept a similar one with the Fluke Engineering Co., of Somerset, Penn.

Robert Howard, of Price, Utah has been appointed State Coal Mine Inspector of Utah by Governor Bamberger in place of J. E. Pettit. Mr. Pettit has been appointed superintendent and general manager of the Grass Creek Fuel Co.

J. C. Noel, who has been connected with the Consolidation Coal Co. at Jenkins in Letcher County, Ky., as chief engineer, has resigned and accepted similar work with Fox, Peck and Pursiful, Hazard, Ky. He will do field work exclusively.

M. A. Rowan, mining engineer for the C. & E. I. Ry. coal properties has been temporarily located at Sesser, Ill., engaged in completing the alteration of the Sesser Coal Co.'s mines from the "room-and-pillar" to the "panel" system of working.

Harry Maitland, formerly mine manager of the Sesser Coal Co. and lately employed at the North mine at Chistopher, Ill., is now located at Taylor Springs as mine manager for T. C. Keller, receiver for the C. & E. I. coal properties at No. 15 mine.

F. W. McElroy, formerly assistant advertising manager, has been appointed advertising manager of the Alpha Portland Cement Co., Easton, Penn. He succeeds S. Roland Hall, who has resigned to become advertising manager of the Victor Talking Machine Co.

W. J. Eddy has been appointed superintendent of fuel economy for the Chicago, Rock Island & Pacific Railroad Co., with jurisdiction over all matters pertaining to fuel economy. The engineer of fuel economy and the supervisor of stationary plants will report to him.

George Wilkinson, manager of the Western Fuel Co.'s Reserve mine at Nanaimo, B. C., has been recommended to the lieutenant-governor for appointment as chief inspector of mines in the province. This office was recently made vacant by the resignation of Thomas Graham.

George M. Gray, who, for the past year and a half, has been employed as outside foreman at the Coalbrook colliery of the Delaware & Hudson Co., has tendered his resignation. He has secured a more lucrative position as superintendent of a large coal company in the southern part of Pennsylvania.

James Ashworth, a well-known consulting engineer of Vancouver, B. C., has been asked by the Minister of Mines to take part in the investigation of the disaster at Coal Creek. Mr. Ashworth, although not a government official, is a mining expert of wide experience in the coal fields of Britain and western Canada.

James Pearson, who has been in charge of the mines of the Cottonwood Coal Co., at Stockett and Lehigh, Mont., for several years has tendered his resignation. He will proceed to California for a few months' rest when he will return to Montana to take up the active management of his personal interests in that section.

James B. Neale, a coal operator, whose model homes for miners have attracted attention the country over, has been appointed a justice of the peace by Governor Brumbaugh. He took the oath of office on Apr. 13. Because of the implicit confidence the miners impose in him, it is believed he will make an ideal adjuster of petty disputes.

E. J. Wallace, since 1915 southwestern sales manager for the Chicago & Carterville Coal Co. in St. Louis, Mo., has resigned to go with the Stephan Coal Co. as sales manager. This is one of the oldest wholesale and retail companies in St. Louis, and in the future will handle the product of the Chicago & Carterville Coal Co. in the southwestern territory.

Henry Frantz, Jr., superintendent of the mines of the Clearfield Bituminous Coal Corporation at Rossiter, Penn., has been appointed by Judge Corbett of Jefferson County to act as board member for the operators to examine candidates for mine foremen and fireboss certificates in the 12th Bituminous District. He succeeds Robert B. Dick, who recently located in West Virginia.

D. B. Sebastian, after many years of loyal service with the mining and fuel dept. of the Chicago, Rock Island & Pacific Railway Co., has resigned to engage in private business and the office of assistant manager of this department has been abolished. Mr. Sebastian's resignation was reluctantly accepted and he goes to his new work with the best wishes of his former associates.

B. R. Lindsay, for the past two years superintendent of the Bowood and Martin mines of the Republic Iron and Steel Co. has resigned his position to accept that of superintendent of mines for the Jewett, Biglowe & Brooks Co., of Boston, Mass. Mr. Lindsay will have his headquarters at Twin Branch, W. Va. and will have charge of the six mines owned by the company operating in the Tug River field.

Obituary

W. P. Hyde, one of the best known shaft mine contractors in Pennsylvania and West Virginia, was shot and killed at Carlisle, W. Va., on Sunday, Apr. 15, by Fred Brabier, a negro and one of Hyde's employees. Mr. Hyde had gone with J. A. Wren, an officer, to arrest Brabier. Brabier fired at Mr. Hyde killing him and making his escape into the woods.

James Pease, aged 65, president of the Chicago & Carterville Coal Co., one of the largest producers in the Williamson County, Ill., field, died at St. Luke's hospital in Chicago on Apr. 11. Mr. Pease was born in Wilmot, Wis., July 12, 1851, and began his business career in Chicago as a house painter and paper hanger. He was a poor man for many years until he got interested in politics and was nominated in emergency for assessor and was elected and served for 9 years. In that time he built up a following in politics and got the nomination for sheriff of Cook County. He was elected and served from 1904 to 1908. During his years in politics he accumulated some wealth and invested in coal lands in Williamson County and became president of the Chicago & Carterville Coal Co. He was active until last fall when he was removed to the hospital. He is survived by a widow, one son and three daughters.

Industrial News

Barbourville—The Tiffany Coal Co., organized by Barbourville men, is installing a mining operation at Kell Station, six miles from the city.

Chicago, Ill.—The Sullivan Machinery Co., Ltd., recently announced that it will remove its office in Montreal to Toronto, Canada, at 37 Colborne Street.

Pittsburgh, Penn.—Samples of Crow's Nest coal are being used in explosion tests at the experimental mine of the Bureau of Mines at Pittsburgh.

Columbus, Ohio—The Lorain Coal and Dock Co., now located in the New Hayden Building, has leased the entire fifth floor of the Huntington Bank Building and will move June 1.

Ligonier, Penn.—The Connellsville Coke and Fuel Co. has purchased a large tract of coal land in Ligonier township from Robert H. Murphy. The price was approximately $200 per acre.

Connellsville, Penn.—J. G. Patterson, an extensive coal operator of Pittsburgh, has purchased from the heirs of Thomas Holder, 134.11 acres of coal in Morgan Township, Greene County. The consideration was $40,233.30.

Indiana, Penn.—Deeds have been recorded here recently showing the purchase of large tracts of coal land by the Clearfield Bituminous Coal Corporation and Peale, Peacock and Kerr, Inc. near their present respective holdings.

Nicholson, Penn.—Eighty-eight acres of bituminous coal land were sold on Apr. 13 by R. M. Fry, to the Consolidated Coke Co. for $80,000. Mr. Fry purchased the coal tract on Apr. 9, from the Cover estate, paying $72,000 for it.

Fairmont, W. Va.—It has been announced by the general offices of the Consolidation Coal Co. here that a contract has been let to the Shinnston Planing Mill Co. for the erection of 110 miners' dwellings at the new operations at Wyatt, W. Va.

New York, N. Y.—A report issued by the New York Chamber of Commerce shows that the railroads of the country in 1916 consumed an unprecedented total of 200,000,000 tons of coal. In former years it is reported that the amount seldom ran above 150,000,000 tons.

Washington, D. C.—Dedication of the new building of the Bureau of Mines at Pittsburgh has been postponed indefinitely along with the plans for meetings of the national scientific societies interested in mining. The dedication will not be held until after the war.

Clarksburg, W. Va.—It has been announced by officials of the Kellys Creek Collieries Co. that this company's properties have been sold to the Valley Camp Coal Co. of Cleveland, Ohio. The consideration has not been mentioned but it is said to be in the neighborhood of $1,000,000.

Birmingham, Ala.—The regular monthly meeting of the Alabama Safety Association will be held on Apr. 21. The organization and training of first-aid teams is receiving a great deal of attention at this time and plans for the annual field meet to be held on June 2 will be discussed.

Columbus, Ohio—Reports from the upper Lake region indicate a rather late opening of the Lake trade. There is still considerable ice in the upper channels and in Superior and coal men believe that the opening will be delayed from 10 days to two weeks from the usual time of opening navigation.

Harvel, Ill.—Work has been begun here on the Southern Illinois Electric line, which is to run from Springfield south through the center of the state, touching, besides Harvel, Hillsboro, Greenville, Carlyle, Nashville, Pinckneyville and Carbondale and ultimately extending to Cairo. Coal is to be hauled by electric motors.

Seattle, Wash.—An unprecedented demand for coal in the Northwest, due to the high price of fuel oil and to increasing industrial activity, has caused Dorsey A. Lyon, the superintendent of the Seattle station of the Bureau of Mines, to push with all possible rapidity the coal investigation plan to cover the entire Northwest.

Marion, Ill.—The Spiller strip mine near Spillertown has been sold to Burton & Co. of Chicago. Several additional acres of the Spiller farm have also been taken, and the company is proceeding to open the entire tract. This will be one of the largest strip mines in southern Illinois as soon as steam shovels can be procured.

Indiana, Penn.—The Jones Coal Co. which recently took over the mine of the Foreman Coal Co. near Indiana, has purchased a tract of Pittsburgh coal on the Iselin branch of the B. R. & P. Ry. The openings are completed, sidings and tipple are being constructed and coal will be shipped about May 1 from the new operations.

Medora, Ill.—A contract has been made by a number of citizens of Medora with a competent driller who will soon commence drilling for coal near the town. Residents of Medora have reason to believe that a good bed of coal will be found to the northeast of the town, and have organized a company and entered into a contract to have a test made.

Washington, Penn.—Three hundred acres of Pittsburgh coal were sold recently to the Lily Coal and Coke Co. The coal is under three farms south of Washington borough. A large mine employing 300 to 500 men will be opened within the next three months. The purchase price is $300 per acre and $10 per acre to bind the deal was paid over immediately.

Clarksburg, Penn.—Charles E. Pool of Clarksburg in partnership with a number of others has purchased 1137 acres of rich coal and surface land, consisting of 17 farms in Fetterman district, Taylor County, and Union district, Marion County, from the Bessemer Coke Co. of Pittsburgh. This property is under development and is being improved by the addition of coke ovens, miners' houses, etc.

Hazleton, Penn.—Pardee Bros. & Co., operators of the Latimer mines, recently declined to pay compensation to Joseph Naido, struck on the knee by an ax in the hands of Joseph Finch, on the ground that the men were fighting at the time the accident occurred, and that it did not transpire in line with their employment. The mine workers have appealed the case to Referee Beemer, of Scranton.

Chattanooga, Tenn.—Property of the Dayton Coal and Iron Co., recently sold to a representative of Minneapolis men, is on the market again, the high bidders' representative, F. C. Cary, of Minneapolis, Minn., having failed to meet the stipulation of the creditors for a first payment of $50,000. The creditors held a meeting in the courtroom of James H. Anderson, referee-in-bankruptcy, and adjourned to meet again on Apr. 23.

Buffalo, N. Y.—The Delaware, Lackawanna & Western Railroad Co. is building a tunnel from its yard at the foot of Erie St. to the new car dump on the dock adjacent, which will enable it to unload box cars to the dump without interfering with the present dump. The work will take most of the summer. The apparatus is to be of the Weitman-Seaver type, similar to the one now in use at the Lehigh Valley dock here.

Birmingham, Ala.—The Sloss-Sheffield Steel and Iron Co., has planned for the construction of what is perhaps the largest coal storage bin in the Birmingham district. At the Bessie mine the company will start the construction of a bin capable of holding 1500 tons of coal, at a cost somewhat exceeding $20,000. Through this storage facility, this mine will be in a position to operate for an entire day without receiving cars with which to move the coal.

Fernie, B. C.—The members of the Fernie miners union at a special mass meeting recently heard a message of condolence from Premier Brewster, Minister of Mines Sloan, W. A. Macdonald, Attorney General and others. The members of the Government have intimated that the resources of the province would be placed at the disposal of the sufferers from the disaster, and the local Government agent has been authorized to render whatever aid is required.

Huntington, W. Va.—One of the most important recent coal deals in the Guyandotte field was that involving the purchase of the holdings of the Cora Coal and Coke Co., on Main Island Creek by a new firm incorporated for the purpose. This new company, known as the New Cora Coal and Coke Co. was incorporated recently with an authorized capitalization of $250,000. It is stated that the incorporation figures represented the amount of the consideration.

Harrisburg, Penn.—James E. Roderick, chief of the Department of Mines, recently refused to issue mine foreman certificates and assistant mine foreman certificates to 40 men. The list included the names of persons certified by the examining boards in their districts as entitled to these certificates from the showings made in examinations held in accordance with the mine laws of the state. Practically all of these men were residents of Luzerne County and had taken courses in the night schools in their section to qualify for the positions they sought.

Peoria, Ill.—The B. & B. Coal Co., with headquarters in this city, has been sued in the Sangamon County Circuit Court by the Bryan & Sweeney Coal Co., of Kansas City, Mo., for $30,000 damages on account of alleged breach of contract. Naming John and George Bontjes, heads of the B. & B. company, as defendants. The Bryan & Sweeney company alleges that the B. & B. company contracted to furnish coal to the Kansas City corporation and when better market prices were obtainable broke the contract and refused to deliver any more to the Bryan & Sweeney company. The B. & B. company operates mines near Peoria and near Springfield.

Ridgway, Penn.—Extensive developments are to be made in the coal fields of Elk County during the next few months. Several mines will be placed in operation in the vicinity of Trout Run and Benezette, where valuable coal beds were struck last fall. The most important mines to be opened will be those located at Trout Run and owned by the Hall-Kaul company, which contemplates building a railroad from the mines to St. Marys. During the winter vast areas of coal lands have been leased in the vicinity of Benezette, Rathbun and Beechwood and many mines will be placed in operation this summer. Most of the coal lands which have been purchased or leased are owned by Elk County farmers. In most cases, they receive a royalty on the coal produced from their lands.

Norristown, Penn.—Fire of supposedly incendiary origin on Apr. 11, caused a loss of $100,000 at the coal storage plant of the Philadelphia & Reading Coal and Iron Co., at Abrams Station, on the main line of the Reading Ry. The fire in addition to crippling the operation of the crane and conveyor used in loading and unloading coal, menaced several homes. Several buildings were destroyed, among them being the one containing the conveyor equipment valued at $75,000. In view of the fact that a few days ago the last of the million tons of coal stored on the 8 big platforms had been removed, the conveyor was not in use. The plant was virtually idle, while members of the National Guard were patrolling the railroad in the vicinity of the plant. There were no guardsmen about the building. Fires in three structures burst forth in such rapid succession as to give the impression that they started simultaneously and had been set on fire.

Springfield, Ill.—Commissioner Walter A. Shaw of the Illinois State Public Utilities Commission has issued a dissenting opinion to the 5 per cent increase recently allowed by the commission on coal freight rates, moving intra-state. He contends that the increase will disturb trade relations which have grown up at coal market centers. In order to maintain present trade relations he advocates a horizontal increase of 5c. a ton. Freight rates as now fixed, he says, take into consideration not only freight differentials but also the cost of coal in the different districts, the thickness of the coal beds, the heating value of the several coals and many other elements of production costs. Intra-state coal rates into Chicago now range from 57c. for the northern Illinois group to $1.05 for the southern Illinois group. An increase of 5 per cent., therefore, makes the range of increase vary from $0.0285 for northern Illinois coal to 5¼c. for southern Illinois coal. In view of the fact that a large portion of the coal is handled by brokers on narrow margins, he says, it is quite probable that a disturbance of present differentials would create new and drastic conditions in the competitive coal market.

Philadelphia, Penn.—An interesting side light on the freight situation is that the railroads transporting the greater portion of coal from the Lehigh region to this market have refused to reduce their freight rates in accordance with the recent order of the Public Service Commission. The particular coal affected reaches here via Phillipsburg, N. J., and then re-enters the state. The railroad company contends that this is an interstate rate and the state commission has no jurisdiction. Even before the reduction was ordered this coal took a 16c. higher rate, which was in many cases assumed by the shippers, but now with the rate on prepared sizes reduced 25c. it makes the differential on this particular coal 41c. which comes near being prohibitive. This decision is proving particularly embarassing to a number of dealers who for years have been getting their entire supply via the above route. Appeals have been made to the railroad company pointing out the injustice of their ruling and failing in this direction the only recourse will be to the Interstate Commerce Commission, with the many delays incident thereto. In the meantime a number of dealers are endeavoring to make new alliances, but with little hopes of success under present conditions.

Market Department

GENERAL REVIEW

Heavy spring rush for anthracite and the outlook very uncertain. Prompt bituminous market easier but producers still firm on business ahead. Clearing up of rail congestion has created an artificial surplus for the moment. Cool weather shakes out considerable season end orders.

Anthracite—The spring rush for coal is attaining greater proportions as the buyers come to a realization of the full gravity of the situation, and the only redeeming feature is that there is little need of coal for immediate consumption. There are two general opinions as to the outlook for the trade, that most generally accepted being that with the enormous storage of reserves of the companies completely exhausted, together with the possibility of production being restricted by rail congestion, heavy drafts of miners for military service and other conditions of a like nature, an acute shortage of coal is inevitable. On the other hand, the continuous operation of the mines throughout the summer period when it is customary to work half time or less, will provide a very substantial extra tonnage to see the hard-coal trade through the year. But aside from these known factors, there are the unprecedented conditions precipitated by our participation in the war, which no one can foresee.

Bituminous—The market is still very confused though it is noticed that shipments on contracts are slightly better, and prices are easier, but in spite of this there is little free coal offering. A very noticeable falling off in the export demand together with a comparatively poor bunker business and restrictions in the coastwise movement, have tended to create some surpluses at the loading ports, though it has made the situation at down East points even more serious. While there is considerable delay in loading commercial coal at Hampton Roads, it is noticed that Government vessels have no difficulty in this respect. The possibility of some drastic action by the Government in taking over some of the coastwise colliers looms up as an important consideration in this trade; it is obvious that all-rail deliveries cannot be relied upon in that section, and there is no way at the present time whereby consumers can cover their requirements with any assurance. Offers of high prices still bring out some free coal from some unknown source, but unless producing and shipping conditions are better than anticipated it is likely that some operators have already oversold their possible production.

Lake Trade—The trade is hampered by inadequate car and labor supply, but there has been some increase in both, with the result that the market is easier at this time. The situation is peculiar in some respects, there being very little demand for spot coal at the ruling high figures, but at the same time there is practically none being offered, so that the market continues strong at this level. The clearing up of the rail congestion has created an artificial surplus for the time being, which has tended to make the buyer feel easier than he is justified in doing, particularly now that Lake shipments are beginning to get under way. In spite of the obvious scarcity of supplies, retailers are not showing the interest in stocking operations that would be expected. Contracting in the Pittsburgh district has ceased, a great deal of tonnage having apparently been covered under temporary arrangements whereby prices effective at the time of shipment are stipulated. In Ohio contracting has been more active at prices ranging from $2.50 to $3.25 and it is understood that a deal involving 3000 tons of No. 8 mine-run per day has been concluded for a three-year period at $1.70 per ton f.o.b. mines, though this will be subject to the recent increase granted the miners.

Middle West—The cooler weather has stimulated considerable end-of-the-season buying, and the extra demand has created renewed activity, causing a highly speculative market. In the meantime car shortage has not improved and mine operations have been very substantially restricted. The heavy demand from the railroads has readily absorbed any surplus tonnages that might have appeared in the open market, while a very exceptional demand for storage coal from other consuming interests is evidence of the fact that there is a growing realization of the seriousness of the situation.

A Year Ago—Mine operations curtailed and market dominated by uncertainties concerning the new circular. More bituminous contracts concluded. Lake loading getting under way and market moderately firmer. Middle Western situation dull with mine operations rigidly curtailed.

Comparative Average Coal Prices

The following table gives the range of mine prices in car lots per gross ton (except where otherwise noted) on 12 representative bituminous coals over the past several weeks and the average price of the whole group for each week:

Boston	Year Ago	Apr. 21	Apr. 14	Apr. 7
Clearfields	*$1.45@1.90	$4.50@4.75	$4.75@5.50	$4.50@5.25
Cambrias and Somersets	† 1.70@2.20	4.75@5.50	5.15@5.75	4.90@5.50
Pocah. and New River[1]	† 2.80@2.90	5.50@5.75	6.00@6.50	5.75@6.00
Philadelphia				
Georges Creek (Big Vein)	1.90@2.00	5.00@5.25	5.00@5.25	5.25@5.50
W. Va. Freeport	* 1.25@1.35	4.25@4.50	4.50@4.75	4.75@5.00
Fairmont Gas mine-run	1.35@1.45	4.25@4.50	4.50@4.75	4.50@4.75
Pittsburgh (steam coal)[2]				
Mine-run	† 1.20@1.30	3.25@3.50	3.25@3.50	3.25@3.50
¾-in	† 1.30@1.40	3.25@3.50	3.25@3.50	3.25@3.50
Slack	* 1.05@1.15	3.25@3.50	3.25@3.50	3.25@3.50
Chicago (Williamson and Franklin Co.)[2]				
Lump	† 1.35@1.45	3.00@3.25	3.00@3.25	3.50@3.75
Mine-run	1.20@1.30	2.50@3.00	2.75@3.00	2.95@3.05
Screenings	† 1.00@1.10	2.50@2.75	2.75@3.00	2.95@3.05
Gross average[3]	†$1.46@1.62	$3.83@4.14	$4.01@4.35	$4.07@4.36

Gross Averages	
Dec. 9	$4.69@5.15
Dec. 16	4.48@4.90
Dec. 23	4.67@5.08
Dec. 30	4.73@5.19
1917	
Jan. 6	5.16@5.53
Jan. 13	4.74@5.11
Jan. 20	4.54@4.98
Jan. 27	4.64@5.03
Feb. 3	4.66@4.86
Feb. 10	4.70@4.95
Feb. 17	4.67@5.04
Feb. 24	4.95@5.29
Mar. 3	5.10@5.48
Mar. 10	5.36@5.61
Mar. 17	4.80@5.19
Mar. 24	4.64@4.94
Mar. 31	4.20@4.44

[1] F. o. b. Norfolk and Newport News. [2] Per net ton. [3] The highest average price made last year was $4.80@5.33 made on Nov. 25. * Price lower than the week before. † Price higher than the previous week.

BUSINESS OPINIONS

Iron Age—The steel trade is looking more closely into the influences the war situation has set in motion, that will hold prices in check. The ultimate result of the concessions made to the Government is being considered; also the effect of the fixing by the Government of prices on certain contracts which mean a loss to those who take them unless they can get steel products at less than today's prices. The market itself has given no sign in the past week of turning away from the long round of price advances. Domestic buying in some lines is less than in March and buyers are showing their perplexity. But most forms of steel are just as difficult to get and there is the unknown factor of the extent to which consumers in ordinary channels must stand aside for the wants of the Government and its Allies.

Marshall Field & Co.—Wholesale distribution of dry goods for the current week is running about even with the very heavy volume in this period a year ago. Road sales for immediate shipments are about the same as in the week 1916, while road sales for fall delivery are much in excess for the corresponding period last year. Customers have been into market in smaller numbers.

The American Wool and Cotton Reporter—There was a very decided spurt in wool trading started as soon as word was received from the U. S. Government that it deemed itself unable to avail itself of the offer of the trade of all wool on hand at prices of Apr. 2. Business has continued good throughout the week. Medium wools are taken mostly for filling huge Government orders. There has been some speculation, particularly in B. A. 4s and 5s. The growers are very high in their ideas.

Dun—Changing conditions in business result from the national exigency, but thus far the economic readjustments have been effected with a minimum of unsettlement. Both producing and distributing interests give precedence to Federal requirements, and in banking circles action has been taken with a view to facilitating the proposed extensive financing. Commercial failures this week are 251, against 241 last week, 279 the preceding week and 361 the corresponding week last year.

Bradstreet—Conservatism engendered by the war plays a minor role to the activity created by the crisis, which has further stimulated demand for ship steel, ship lumber, harness, saddlery, mules, blankets, underwear, clothing, shoes and numerous other articles. Industry hums while mobilizing in aid of the Government, the wants of which will receive preference as to deliveries, in addition to price concessions, and large financial interests show a strong desire to take whatever bonds the Government may offer at low rates of interest.

Dry Goods Economist—The process of adjustment to the new conditions has begun. Buyers and sellers of merchandise are alike impressed with the difficulty of forecasting the future in regard to supply and demand, more especially supply, now that this country has decided to enter actively into the war. As a result of this attitude sellers have shown decided unwillingness to make commitments in some of the greater and more important lines.

CONTRACT PRICES

Cleveland—Contracting has been active in this section, with several large deals having been concluded at prices ranging from $2.50 to $3.25. It is reported that the Geo. M. Jones Co. has closed a contract with the Pennsylvania Co. for 3000 tons of No. 8 mine-run coal per day for three years at $1.70 per net ton f.o.b. the mine, based on the old mining scale.

Buffalo—The recent bid of $4.72 for furnishing the local water-works with 60,000 tons of bituminous coal during the next year was not accepted, and the coal will be bought in the open market for the time being. Consumers are not generally offering more than $3 as a rule, but sellers are usually refusing this price, preferring to sell in the open market.

Pittsburgh—Contract negotiations have apparently ceased, though the market is nominally quotable at $3.50 to $3.75 for steam coal over the next year, with perhaps some premium on gas coal. It seems that most of the tonnage has been covered under temporary arrangements whereby the current market figure at the time of shipment is paid.

Milwaukee—The City Government has placed a contract for supplying the water-works with 2000 tons of Youghiogheny screenings at $6.75 per ton. Requests for bids on 1000 tons of Pocahontas screenings were also made but none received. Youghiogheny pile-run was offered at $7 per ton.

St. Louis—Contracting has ceased almost entirely though it is reported that three mines in the Harrisburg district have sold their entire output to the Big Four R.R. until Apr. 1, 1918.

Louisville, Ky.—Producers are becoming steadily more cautious about commitments on their contracts, though an occasional deal is reported on eastern Kentucky mine-run at $3.50.

Washington, D. C.—The Navy Department has asked for bids on coal for various deliveries as follows: Semi-bituminous 57,000 tons; steaming, 1,097,500 tons; bituminous, 78,300 tons; semi-bituminous, 54,000 tons.

Atlantic Seaboard

BOSTON

Export and bunker-trade noticeably diminished, and supplies coastwise correspondingly easier f.o.b. Pocahontas and New River off somewhat in price, but delivered quotations still very firm. Market for Pennsylvania grades active. Anthracite receipts extremely light, and apprehension increases.

Bituminous—The diminution of ocean tonnage seems to have had its effect upon the export and bunker trade at Hampton Roads. The volume dumped into foreign bottoms is distinctly less than a month ago and coal is therefore in somewhat better supply for coastwise movement. Practically all, however, is being applied on contracts, the tonnages available for spot sale being small and scattering. Spot prices have shown a mild reaction, however, minimum present quotations being in the vicinity of $5.50@5.75. There is always present the possibility of drastic ac-

tion by the Government and in that case it is recognized that coal will be extremely hard to get and commercial boats will be in for delay in loading. The Government has only to take a few coastwise colliers to cause a very serious situation, so far as this territory is concerned.

The contract situation is practically at a standstill. Boats are next to impossible to get for more than a trip at a time and none of the agencies will make commitments beyond the present month, and then only with numerous provisos. The few large buyers who did not enter the market in January and are now confronted by high water freights are securing what coal they can get all-rail from Pennsylvania. So far those who contracted with factors here who control their own water transportation have been kept fairly well supplied, although stocks in New England have had no chance to accumulate. So much of the transportation is moving cautiously along the coast that the usual number of trips are not made. There is much wondering as to what will happen next.

Several consumers, most of them east of Boston, seem unable to outline any program under the present unsettled conditions. Concerns which have always done a large distribution business inland from points like Portland and Bangor are on the point of deciding they will withdraw from the bituminous trade this year altogether. The situation next fall is bound to be very serious over large areas of New England. Those conversant with the trade are helpless to arrange for supplies with any assurance of their delivery. It seems idle to depend upon all-rail deliveries for any comprehensive quantity of coal where points much nearer the mines had to exist on meager shipments the past year.

On-car prices for Pocahontas and New River are very firm. What coal offers is from rehandling plants where occasionally there is a small surplus to sell at high figures; $11 continues the prevailing quotation, both at Boston and at Providence, but such prices are only for spot delivery. No orders are accepted for deferred shipment. In fact, regular customers who did not secure contracts are not given any prices except "market at time of shipment."

There is no marked change this week in the Pennsylvania bituminous situation. Prices are a shade easier for prompt shipment, the buying power having relaxed somewhat, but the demand is still strong for deliveries over any period. Only relatively small tonnages of the better grades are available. Many of the operators have oversold their output, unless car and labor shortages improve, which now seems out of the question, but the experience is that high prices will always draw out some coal. The pressure on the part of railroads to get coal from anywhere and everywhere is less that a fortnight ago. A little more scrutiny of mine origin is a sign that needs in some quarters are not so insistent.

Reports from the mining regions are rather mystifying as to the wage scale discussion. Mining was much curtailed the first of the month on account of the succession of holidays, but it is hard to see where there was any special improvement the week following. Receipts at New York and Philadelphia for dumping into boats continue light and cargoes are hard to assemble. The Government is in close touch with some of the shippers and any day large tonnages may be commandeered. All-rail movement is fair.

Bituminous at wholesale is quoted about as follows, f.o.b. loading ports at points designated, per gross ton:

	Clearfields	Camb. and Somersets
Philadelphia	$5.75@6.50	$6.00@6.75
New York	6.00@6.75	6.25@7.00
F. o. b. mines	4.50@5.25	4.75@5.50
Alongside Boston (water coal)	8.75@9.25	9.00@9.50

Pocahontas and New River are quoted at $5.50 @5.75 f.o.b. Norfolk and Newsport News, Va., for spot coal, and $11 on cars Boston or Providence for inland delivery.

Anthracite—The situation goes steadily from bad to worse. The approach of warm weather only stirs up the public the more to seek coal for next season. New England retailers are beginning to get reconciled to the extremely hard conditions they face. They are not reducing prices and they are striving not to sell more coal than is actually on hand. Some of the Boston dealers have issued circulars making plain their position. They will not accept orders except with the clear understanding the customer can only hold them to deliver coal if they get it and at the price current at time of delivery. No Boston dealer will now accept orders at a stated price except for immediate delivery.

One blow falls quickly upon another. The trade had no sooner realized the significance of the recent accident to the Mahonoy plane of the Philadelphia & Reading Coal and Iron Co. than the news came that the Government had given notice of intention to take over five additional sea-going tugs. A few cargoes are coming forward, but the proportion is very small compared with the normal movement here at this season.

"Independent" quotations are much higher, considerably less coal being offered than a week ago.

NEW YORK

Anthracite demand heavy with supplies short. Independent operators obtain premiums for their product. Steam coals are hard to get and companies refuse to make contracts. Bituminous shippers uneasy over labor situation. Demand is good and prices steady.

Anthracite—The demand continues heavy while the supplies are far from sufficient to take care of the current orders. Production has been decidedly light so far this month, the miners displaying no desire to work steady. In addition shipments on the Reading were delayed owing to a serious accident on the Mahonoy Plane, necessitating the hauling of Tidewater coal over a longer route.

The coal movement to the West is unusually heavy, which in itself diverts a considerable tonnage that would otherwise go to the East. This demand will be increased now that navigation on the Great Lakes opened officially on Monday of this week. With mine prices on a higher basis on this business than those at Tidewater it is to be expected that considerable coal will be sent there.

New England buyers are busy in this market but boats are hard to get except at high rates.

While the large producers are striving to take care of their regular trade with curtailed stocks, the independent operators are disposing of their product at substantial premiums over the April circular. Some sales have been reported at as much as $1.25 above the company quotations although most sales have been at a much lower figure. Quotations at the mines range from $4.75 to $5.

At the Tidewater docks mixed cargoes bring lower prices than straight cargoes of either egg, stove or chestnut. Egg coal was the shortest and some shippers had none to offer. There was some broken coal offered at $5.75 f.o.b. and it was soon picked up.

The supply of steam sizes continues far below the demand. There has been no change in the wide difference in prices by the producers and shippers. Buckwheat No. 1 is being quoted at the same figures as pea. Some shippers refuse to make quotations saying they have no coal to sell at any price. Barley is the longest of the three sizes. A small tonnage of boiler coal was offered and quickly picked up at $3 alongside early this week.

Current quotations, per gross ton, f.o.b. Tidewater, at the lower ports are as follows:

	Circular	Individual
Broken	$4.95	
Egg	4.95	$6.00@6.50
Stove	5.20	6.00@6.50
Nut	5.25	6.00@6.50
Pea	3.60@4.10	5.00@5.75
Buck	3.70@3.80	5.00@5.75
Rice	3.00@3.30	4.25@4.50
Barley	2.50@2.80	3.25@3.40
Boiler	2.20	2.25@2.50

Quotations for domestic coals at the upper ports are generally 5c. higher on account of the difference in freight rates.

Bituminous—There has been a feeling of uncertainty in the situation this week. Supplies are short due to good demand and to curtailed production on account of many individual strikes in the central Pennsylvania regions. There has been sufficient coal at the New York Tidewater to take care of the contracts but the supply of free coal is short.

Contract making is proceeding slowly. There is more or less hesitancy about closing up in view of existing conditions. Labor is short and in some instances employees are seeking other fields of industry. The lack of labor and the disinclination of those who remain at the mines to work has added to the seriousness of the situation.

Many large consumers as well as some railroads are still without full protection as to this year's supply of coal. The operators are not willing to tie up more than 50 per cent. of their output. Offers are plentiful and some have been made at higher prices than the early contracts were closed at, namely $3.50 to $3.75 at the mines. Some contracts for gas coal involving small tonnages and widely scattered have been closed at the same figures.

There is a good demand for coal from Long Island Sound points but boats are scarce and rates show a material increase.

Current quotations, per gross ton, f.o.b. Tidewater, for various grades are as follows:

	Port Reading	South Amboy	Mine Price
George Crk. Big Vein	$6.75@7.00	$6.75@7.00	$4.75@5.00
Tyson	6.50@6.75	6.50@6.75	4.50@4.75
Clearfield	6.25@6.50	6.25@6.50	4.25@4.50
South Frk	.....	6.50@6.75	4.50@5.75
Nanty Glo	.....	6.50@6.75	4.50@4.75
Som'r. Co	6.25@6.50	6.25@6.50	4.25@4.50
Que'ho'ing	6.50@6.75	6.50@6.75	4.50@4.75
W. V. Fa'rm't Th'r'qua	6.25@6.50	6.25@6.50	4.25@4.50
Mine-run	6.25@6.50	6.25@6.50	4.00@4.25
West. Md.	6.25@6.50	6.25@6.50	4.00@4.25

PHILADELPHIA

Anthracite continues in unusual demand. Shippers refuse additional orders. Heavy retail orders booked for future delivery. Steam grades quickly absorbed. Bituminous prices ease off slightly except on high grades. Railroads heavy buyers and Government calls on shippers for maximum tonnages. Car supply improved.

Anthracite—The spring rush is on in greater volume than ever, with coal just as scarce and dealers as disgruntled as they were any time during the past winter. The only redeeming feature of the market is that the domestic coals are not actually needed for immediate consumption though the unseasonable weather of last week, including a heavy snowstorm, did cause a brisk demand for small lots. Dealers who had stocks left over from March, greatly reduced them and this made them more insistent than usual for April shipments.

The demand for coal is now so heavy that many of the large shippers are refusing additional business until the orders already booked can be taken care of. The salesmen have practically ceased to solicit orders and those dealers who were disgruntled over alleged poor treatment by their shippers during the winter and who had hoped to make new alliances in the spring have been much disappointed. They have now come to the conclusion that it is not safe to sever any relation that might even promise them so little as a single car a month.

The fact that the freight rates have not been lowered, on account of the interstate dispute, caused many dealers located on the Pennsylvania R.R. to withhold their orders for the first week or two. They had hoped that the freight question would be promptly adjusted but as they now find they must have coal they are giving instructions to ship regardless of the rates. It is generally agreed that the railroad is standing purely on a technicality but if they persist in their attitude it is feared that nothing but an appeal to the Interstate Commission will afford relief. However, even at that the shippers and dealers are of the opinion that the rate will be made uniform with the other rates and that a refund will also be forthcoming.

There has been no time this year when the demand for coal has been heavier. The supply is inadequate, due largely to the restricted working time during the first half of the month, but the dealers whose claims on the shippers are the greatest feel they are being neglected for other markets. None of the dealers have sufficient stock to meet the current demand and most of them feel they are not being treated right.

Notwithstanding the short supply the representative dealers continue to advertise prices very extensively and urge the public to buy next winter's coal now. They are booking orders for thousands of tons hoping for liberal shipments not later than next month. Many of the dealers are evidently taking it for granted that the May prices will advance only the usual 10c. a ton, as they are protecting their customers for several months at the present prices.

With bituminous coal and the anthracite steam sizes so high the operators are being tempted with offers from manufacturers to contract for the year on pea coal at $3.50. Very large blocks of this size have already been sold at this figure and it is taking this tonnage away from the domestic market where it, of all the sizes, can least be spared. In fact it is on pea coal, the "poor man's fuel," as our newspapers like to call it, that we expect the most acute shortage from now on.

On this size the largest company is now making very fair shipments at $2.30 but it does not seem to lessen the demand in the least for the $3 coal; strange as it may seem there is more of the lower-price coal coming here from the Reading than the $3 coal from other companies.

Shipments from many of the companies reaching this market were seriously hampered this week by the breaking down of Mahanoy Plane in the mining region. One company alone was on this account compelled to suspend operation at nearly thirty collieries for three entire working days.

The activity in steam coals of all sizes continues unabated and many inquiries are made on all shippers for heavy tonnages. Most of the buckwheat is being moved at $3 a ton, although to new customers the prices is usually $3.25 and often runs to as much as $3.50. Quite a number of the manufacturers using soft coal are making strong efforts to secure the smaller steam sizes for mixing with bituminous coal.

The prices per gross ton f.o.b. cars at mines for line shipment and f.o.b. Port Richmond for tide are as follows:

	Line	Tide		Line	Tide
Broken	$4.50	$5.65	Buck	$2.50	$3.40
Egg	3.65	4.75	Rice	2.00	3.00
Stove	3.90	5.10	Boiler	1.80	2.90
Nut	4.00	5.05	Barley	1.50	1.75
Pea	2.80	3.70			

Bituminous—With the exception of the high-grade coals the market has continued to ease off moderately as to prices. The best grades are in such strong demand that they have no difficulty in holding firm at figures around $5@5.25,

although the declines on the other grades average about 25c. a ton.

The market at this time is in a somewhat peculiar state in that the inquiries have fallen off very considerably, although on the other hand there is very little coal offering. Ordinarily when buyers are temporarily out of the market brokers have good tonnages offered to them from every quarter, but of late these offers have not been made, which would seem to indicate a short supply of coal to meet current needs.

The heaviest buyers have been the railroad companies, who thus far have been unable to place anywhere near the usual quantity they desire under contract.

Nothing definite as yet seems to have developed in connection with the requirements of the Government for additional fuel which was to be expected with the navy on a war basis. However, it is reported the Government authorities are taking advantage of the maximum clause in their contract agreements and calling for full shipments, which some companies are finding extremely embarrassing under present conditions.

The demand for slack coal continues with but very little sign of a let-up.

The car supply has improved quite considerably, many shippers reporting allotments as high as 60 per cent. of their requirements.

The prices per gross ton f.o.b. cars at mines are as follows:

Georges Creek Big Vein	$5.00@5.25
South Fork Miller Vein	5.00@5.25
Clearfield (ordinary)	4.50@4.75
Somerset (ordinary)	4.50@4.75
West Va. Freeport	4.25@4.50
Fairmont gas lump	4.50@4.75
Fairmont gas, mine-run	4.25@4.50
Fairmont gas, slack	4.00@4.25
Fairmont lump, ordinary	4.25@4.50
Fairmont mine-run	4.00@4.25
Fairmont slack	4.00@4.25

BALTIMORE

No cut in local anthracite prices. Bituminous conditions slightly easier, but movement is still light.

Anthracite—While the local schedule is as yet delayed, coal men here have reached the decision that there will be no spring reduction in prices. While the largest producer is delivering limited quantities of all sizes, except broken, and pea coal, at a fifty-cent discount, all the other companies are either adhering to the old winter schedule or are refusing to quote for anything except immediate deliveries.

Under such circumstances the trade here cannot afford to book orders at below the last winter schedule in any case. The advance on broken as compared with the last winter schedule will be $1.15, and the increase on pea coal will be 25c. New prices, when formally announced with twenty-five cents off for cash, will probably be as follows: No. 1, $8.75; No. 2, $8.25; No. 3, $8.50; nut, $8.65; pea, $6.75; Sunbury, No. 2, $8.50; same, No. 3, $8.75. The trade here also faces the condition that in the future it will all be thirty-day business, and there will be no more carrying over month to month of orders at low rates. Under the above schedule No. 1 is expected to be forced out of use here in apartment houses and industries with larger furnaces.

Bituminous—While steam coals held pretty firmly here and at the mines, there was a little slackening in prices for gas fuels. The restricted movement by water, to New England points, is having its effect. Comparatively poor bunker business and uncertain prospects along that line have also lessened the pressure here. The movement to tide, however, has been comparatively poor, and there has been a ready demand for any free coal coming through.

Prices to the trade at the mines are about as follows: Georges Creek Tyson, $4.25; Somerset, $4.00 to $4.25; Quemahoning, $4.25; Clearfield, $4.00; Freeport, $3.75; Fairmont gas, three-quarter, $3.75; run-of-mine, same, $3.75; slack, same, $3.50.

HAMPTON ROADS

Movement from mines for past week poor. Prices stiffened. Serious congestion of vessels at Newport News and a strike of the trimmers is threatened.

Car supply and movement have been unusually poor during the past week, though it was a little better the latter part. This caused prices to regain the slight loss of a few days ago and, as long as present conditions continue, there is little prospect of any cheaper coal in the near future. Consumers who were afraid they were too soon in closing their contracts are now in a better frame of mind, in view of the continued strength of prices and the withdrawal from the market of several of the larger shippers. Announcement has been made by some of the larger interests that they will not accept any further business pending advices from the Government as to what tonnage they will be required to furnish.

At Newport News berth space has been at a premium for the past week, and vessels have suffered serious delays. This is partly due to shortage of motive power in the yards causing delay in delivering coal to the piers. The Virginian Ry. at Sewalls Point is also short of yard engines, but the delay has not been so noticeable on account of the comparatively few vessel arrivals. Trimmers at Newport News are demanding more money and have threatened to strike. The men are still at work but the arrangement is understood to be only temporary. There is no trouble with the dumpers. Notwithstanding all the difficulties experienced with vessels loading for commercial account Government vessels do not meet with an instant delay. Several local men have been summoned to appear before the Grand Jury in New York investigating the alleged bunker combine.

Prices on New River and Pocahontas run-of-mine for coastwise and export shipment are $6@6.50 per gross ton, for bunker delivery $6.50@7, for local delivery on track $5@5.25 per net ton. Anthracite $9 per net ton delivered.

Dumpings at the Hampton Roads piers for the past several weeks were as follows:

	Mar. 24	Mar. 31	Apr. 7	Apr. 14
Nor. & West...	150,654	152,909	174,420	119,340
Ches. & Ohio...	102,418	114,477	112,128	106,188
Virginian.....	89,038	96,084	80,457	66,383
Total.....	342,110	363,470	367,005	291,911

Ocean Shipping

OCEAN FREIGHTS

Freight rates to all destinations are higher than a week ago, and it is becoming more and more difficult to secure steamers for export coal. Although a number of steamers were chartered to take coal to foreign ports during the past week, very few of these fixtures were reported. The only charter worthy of comment was the fixture of the "Felix Taussig" about 7000 tons cargo, from Range to Buenos Aires, at $28.20 per ton, with 1000 tons per day discharge, May loading.

We would quote freight rates on coal by steamer as follows:

Europe	Apr. 9	Apr. 16
West Coast Italy....	$60.00@72.00	$75.00 about
Marseilles.....	60.00@72.00	75.00 about
Spain (Atlantic)*...	27.60 about	30.00 about
Spain (Mediterra'n)*	30.00 about	32.40 about
Note—Charters for Italy, France and Spain read: "Lay days to commence on steamer's arrival at or off port of discharge."		
South America		
Montevideo.....	$27.60 about	$27.60 about
Buenos Aires.....	27.60 about	27.60 about
Rosario.....	28.80 about	28.80 about
Rio Janeiro.....	[3]21.00 about	[3]25.00@27.00
Santos.....	[3]22.00 about	[3]28.00@30.00
Chile (good port)....	17.00@18.00	17.00@18.00
West Indies		
Havana.....	5.00 about	5.25@5.50
Cardenas, Sagua....	6.00 about	7.00 about
Cienfuegos.....	7.25 about	7.75@8.00
Port au Spain.....	10.00 about	10.00 about
St. Lucia.....	10.00 about	10.00 about
St. Thomas.....	8.00@9.00	8.00@9.00
Barbados.....	10.00 about	10.00 about
Kingston.....	7.25 about	7.25 about
Curacao[1].....	8.00 about	9.00 about
Santiago.....	7.25 about	7.75@8.00
Guantanamo.....	7.25 about	7.75@8.00
Bermuda.....	6.50 about	6.50 about
Mexico		
Vera Cruz.....	8.50@9.50	8.50@9.50
Tampico.....	8.50@9.50	8.50@9.50

* Spanish dues for account of cargo. [1] And p.c.
[2] Or other good Spanish port. [3] Net.
W. W. Battie & Co.'s Coal Trade Freight Report.

COASTWISE FREIGHTS

Three dollars and seventy-five cents was quoted this week on an 800-ton sailing vessel, Hampton Roads to Providence, 8 days to load and discharge. No rates are being named to Boston at this writing. The movement of boats is no longer published and it is extremely difficult to get any line on the market.

Rates for New York loading to Long Island Sound ports were higher this week, $1.50 having been paid. Small coasters are very scarce. Charters now to Eastern points will not be considered at less than $3.50.

Lake Markets

PITTSBURGH

Labor supply better. Car supply fair. Contract market neglected. Spot market shade easier.

No precise information is obtainable as to what effect the wage advance to the miners is likely to be. Daily newspaper reports referring to "10%" are not to be taken seriously. The shortage of labor in evidence early last week has disappeared and there is now labor sufficient to load all the cars furnished, car supplies being moderate, better than the average of the past few weeks but not up to what the operators claim they should have.

The indisposition of both producers and consumers to make contracts has been accentuated in the past week, and it is evident that substantially all the contract business that could be put through has already been done. It is necessary to revise estimates of how much contract business has been done, as the volume of spot demand since Apr. 1 has not been anything like what would have been seen if the major portion of the consumers had failed to contract. Quite a number of arrangements have been made, however, whereby shippers furnish customers a certain quota weekly and bill them at an appraisal of the spot market during the week. Such coal is thus taken out of both the spot market and the contract market. The contract market is quotable nominally at $3.50 to $3.75 for steam coal for the twelvemonth, with perhaps a little premium on gas coal.

The market is a shade easier than a week ago, due to the withdrawal of one or two large consumers who were temporarily in the market, but prices are hardly quotably lower, and we repeat former quotations: Slack and steam mine-run, $3.25@3.50; ¾-in. gas, $3.75@4, per net ton at mines, Pittsburgh district.

BUFFALO

Bituminous market still quiet, with slow mining and few cars. Complaints that some roads are discriminating. Contracts very few. Anthracite demand rushing.

Bituminous—The demand is still extremely light and it is this only that keeps prices from going higher. As it is the market is strong without any particular change. The jobber knows about what he can get coal for at various mines and he knows who can use such coal. After that it is a mere matter of finding the consumer. The trade is much more difficult to handle than it used to be, but the profits are good.

It is not easy to say whether cars or miners are the shortest. Just as soon as one shows any improvement the other runs short. Many mines are running only three days a week. At the same time mine owners are picking up every man they can find and paying his fare to the work. There is now complaint that the Pennsylvania Railroad is embargoing certain mining districts and making it almost impossible to get any coal from them and the Panhandle and No. 8 regions are said to be suffering from this.

There is no unsold coal here and jobbers find it impossible as a rule to pick up cars that they may want on short notice. Consumers are not willing to buy much before they need the coal and they frequently wait too long. It is the time of the year for coal to come down in price and they are still expecting it.

Quotations remain much the same, except that smithing is running high and there is some Pocahontas slack coming in at $4.75 per net ton here. Prices are as follows:

Youghiogheny Gas	$5.25@5.75
Pittsburgh Steam	4.75@5.25
Bessemer	4.25@4.75
Allegheny Valley	4.00@4.50
Ohio No. 8	3.75@4.25
Cambria Co. Smithing	5.00@5.50
Pennsylvania Smokeless	3.95@4.45
All Slack	3.65@4.85
Cannel	5.50@6.00

The contract situation is such that the consumer is growing more uneasy. Operators and jobbers commonly refuse all offers, preferring to sell in the open market. The bid of the Valley Camp Coal Co. of $4.72 net for the water-works contract of 60,000 tons of bituminous was thrown out by the city as excessive and authority given to buy in the open market for a while. Consumers are not offering more than $3 for private contracts, but sellers are generally refusing them.

Anthracite—The supply is almost entirely out. Quite a good amount of standard coal is coming in, but the demand is very large and scarcely any of the city trestles can keep a supply. As to independent anthracite the jobbers mostly report that it is impossible to get any. It is all sold so far ahead that the mines will make no prices at present. This does not mean that there is an actual deficiency of coal. Everybody has a supply, but the consumers are laying in their season's supply as they never have done before and it carries off the surplus. While the shippers are pleased with this state of things they are hard pressed to distribute their receipts in a way that will prevent clamor.

The independent operators have put up their prices 25c. and say they will soon be selling everything on winter prices. A war basis to work from has something to do with this but as a rule it is attributed to the recollection of last winter's experiences. Nobody is anxious to get caught as they were then. April will see all the coal put into consumers' hands that can be delivered and it looks as if the demand might continue right along.

One of the anthracite companies has taken Lake tonnage and has loaded five cargoes of perhaps 30,000 tons and some of the others will begin at once. The only way they can get coal for this purpose is to divide with the other branches of the trade. There are no cargo rates and no prices for steamboat fuel yet.

TORONTO, CAN.

Trade quiet with sufficient coal on hand for present demand. Municipal trading in coal authorized by legislature. Plans for advertising future shortage being considered. No contracts being made.

The market has latterly been rather quiet, with supplies coming forward in excess of present requirements. The yards are gradually stocking up but no contracts are being made and cash orders for future deliveries are not accepted, as the situation is regarded as uncertain, the legislation necessary to enable municipalities to deal in coal having been passed and the City Board of Control acting in conjunction with the Harbor Commission is considering a plan to prevent the recurrence of coal shortage. The Coal Section of the Retail Merchants Association has submitted an alternative proposition agreeing, if the city will advance the funds, to purchase and store 100,000 tons of domestic coal not to be sold or delivered before Jan. 1 nor later than the end of March except by authority of the Mayor, the city to be indemnified for the full amount.

Quotations for best grades per short ton are as follows: Retail anthracite egg, stove and nut, $9; grate, $9; pea, $8; bituminous steam, $8.50; slack, $7.50; domestic lump, $9; cannel, $10; wholesale f.o.b. cars at destination three-quarter lump, $6.50; slack, $5.75.

CLEVELAND

Car supply very poor. Contract market active. Strong demand for Lake coal.

The car supply has been very poor; in fact none of the Ohio mines report over 50 per cent. of their capacity. This together with the fact that Lake shippers are bidding strong for all the coal they can get, has stiffened local market prices considerably.

The contract market has been active and several large contracts have been closed the past few days at prices ranging from $2.50 to $3.25.

Railroad freight rates on coal for reshipment via the Lakes will be increased 15c. per ton on Apr. 16. This will make the Pittsburgh No. 8 rate 95c. f.o.b. vessel, the Western Pennsylvania rate 98c., and the Fairmont rate $1.10.

Figures have been compiled showing that the Pittsburgh No. 8 district produced 11,656,000 tons during the year ending Mar. 31, 1917.

It is reported that The Geo. M. Jones company has closed contract with Pennsylvania company for 3,000 tons No. 8 mine-run per day for three years at $1.70 net ton f.o.b. mine, based on the present mining scale.

Following are the market prices per short ton, f.o.b. Cleveland:

	Three-quarter	Mine-run	Slack
No. 8.....	$3.50	$3.50	$3.50
Cambridge..	3.50	3.50	3.50
Middle Dist.	3.50	3.50	3.50
Hocking.....	3.25	3.25	3.25
Pocahontas..	....	4.50	....

DETROIT

Firmer tone develops in Detroit market, with decrease of coal on tracks. Anthracite deliveries slow. Lake shippers find few boats.

Bituminous—With the gradual clearing away of most of the coal that was being held on tracks, following the curtailment of demand for domestic stock, a steadier tone prevails in the Detroit market. Consumers of steam coal who were able to get supplied a few days ago at prices ranging around $2.50 at the mines, are learning that they cannot do business on that price now. Nearly all sizes of gas or splint coal are quoted at the equivalent of $3 at the mines. Demand is not yet as active as it is likely to be soon, when the consumers exhaust the surplus stocks that were acquired by the sudden opening of the congested tracks, letting through delayed shipments. Some of the coal so delivered repersents a purchase price of $4 or more at the mines, having been bought when rail blockades carried prices up.

The buying of domestic coal by householders is now being done in small amounts and the inquiry is irregular. Retail dealers are not showing the interest that wholesalers believe they should; this is due largely to their unwillingness to put their capital into stock now that will be in their yards until next fall. There is a feeling, also, among some of the retailers that prices may be lower a few weeks later.

Anthracite—Jobbers say that some of the larger retail dealers have been releasing orders on anthracite for April delivery. It is reported some dissatisfaction is caused by the fact that delivery seems to be held back in a way that indicates the coal will not get here before May or later. Hard coal that has stood weeks on Eastern sidings, due to freight congestion is now arriving and the supply is quite sufficient for present needs.

Lake Trade—Some of the vessel owners expect that prices on cargo and bunker coal for the Lake trade will be fixed during the coming week, or very soon after a settlement is effected of wage controversies betwen Ohio miners and operators. There is considerable demand for vessel capacity to carry coal to upper Lake docks but owners of boats seem in no haste to close charters.

CINCINNATI

All departments of the market are strong, with limited supplies and high prices. Short car supply is the principal factor.

With no improvement whatever in the car supply, the coal market continued to show remarkable strength for the season, no sign of lower prices being seen, and predictions freely made that prices will go higher instead. Decidedly cool weather, such as that bringing snow on Easter, has served to keep domestic consumption up, and to impress upon the public the strength of the market, and with retailers urging early buying indications are that summer purchasing by domestic users will be heavier than ever before in spite of high prices.

The steam market remains very firm and strong, spot mine-run and nut and slack being scarce around $3.25 per ton f.o.b. mine. The inability of industrial consumers to secure any substantial concession from current prices on contracts, and the real reluctance of operators to bind themselves for a year, has served to hold up contracting to a very considerable extent. Such contracts as are being closed are around $3, although manufacturers declare that such prices are almost prohibitive.

LOUISVILLE

Demand for coal still holding up and supply apparently not adequate. Farms are taking away miners and labor is becoming scarce. Predictions of higher prices in May.

A strong market continues and expectations are that May will see an advance over prevailing prices. Eastern Kentucky mines are reported as generally sold up through April, and orders are difficult to place. Buyers report that they are finding it difficult to get operators to take their full orders and no booking for later delivery is done. Arrival of spring is taking many mine workers back to the farms for the planting season. A better car supply is in evidence. Retail prices show no tendency to decline in Louisville and there are predictions that $12 coal will be seen next winter.

Western Kentucky quotes lump at $1.75@2; mine-run and slack at $1.65. Eastern Kentucky quotes block at $3.75@4; egg, $3.50; mine-run and nut and slack at $3.40. One sale of 60 cars of mine-run coal at $3.25 is reported.

Continued and even more marked disinclination to make long-term contracts is reported on all sides. An occasional contract on mine-run in Eastern Kentucky until September at $3.50 is noted, but for the most part the operators are preferring to operate at the prevailing market and are not quoting prices ahead. One important Southeastern Kentucky operator stated that he was withdrawing prices he had sent out on coal for May shipment in expectation of an increase. A retailer referred to a contract with a smokeless coal producer for 10 cars of coal, and displayed a letter from the operator noting that one car had been shipped and that for a given period in April the naval requisition was 10 per cent. greater than the capacity production of his mines.

BIRMINGHAM

Demand lighter than a week ago though prices have not been affected. Stocks are exceedingly short with all classes of consumers. New developments retarded by slow delivery of material and equipment, while production is held down by labor and car shortage.

Conditions in the trade have been rather quiet during this week, an element of uncertainly permeating the market and affecting both the producer and consumer. Both the spot and contract demand has been slightly off, but prices have undergone no material change. Both contract and spot prices quoted by brokers are for prompt acceptance only. Contract prices range from $2.50 to $3 per net ton mines, and spot quotations are about as follows per net ton: Big Seam mine-run, $2.75@3; washed, $3@3.25; Carbon Hill mine-run $2.75@3.25; washed, $3@3.25; Cahaba, Black Creek and Pratt, $3.25@3.50.

It is announced that domestic dealers have not covered for more than half of their requirements, while a number of the mines have sold up their probable output of domestic grades through the summer months. The regular producers of domestic coal have found the steam market a more profitable channel through which to dispose of their output and in many cases have cut the tonnage on domestic orders placed with them as much as 50 per cent.

Car shortage has been more pronounced during the last few days of the week and a number of operations have lost one and two days for lack of equipment.

Coke

CONNELLSVILLE

Production and shipments heavier. Spot market apparently pegged. No interest in contracts.

The spot furnace coke market has shown a slightly stronger tone the past few days. Requirements are substantially the same, while the production early last week was curtailed somewhat by labor shortage. Labor supply is now about the same as formerly, and car supplies are moderately fair. Spot prices seem now to be fairly well established and do not fluctuate materially with changes in supply and demand. The furnacemen refuse to pay more than $8 for spot coke but occasionally are forced to do so. Foundry coke shows a wider range, as some foundrymen are willing to pay premiums for certain brands they think they must have and the makers of such brands do not hesitate to ask the price.

Nothing further has developed as to contract prices, both producers and consumers being unwilling to take hold with the uncertainties of the situation so great.

We quote: Spot furnace, $8@8.50; contract furnace, nominal, $7@8.50; spot foundry, $10@11; contract foundry, $8.50@9, per net ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Apr. 7 at 379,039 tons, an increase of 9249 tons, and shipments at 376,450 tons, an increase of 10,894 tons.

Buffalo—Prices are still strong, but there is some indication of easing off in the giving out of three grade prices. At one time there was only one price quoted. Connellsville shippers now quote 72-hour foundry at $12@12.50, 48-hour furnace at $10.95 and low-grade and stock at $9.35, all per net ton, f.o.b. cars at Buffalo. The demand is quite as good as formerly.

Chicago—The understanding is the output on coke is mostly sold-up on contract, and what free coke is being offered has taken a higher price. The foundries and furnaces are taking all of this that is being offered.

St. Louis—The demand from munition plants throughout the central West and from ordinary users for byproduct coke has cleaned up the local supply. Offers from $10 to $15 a ton for byproduct coke f.o.b. cars St. Louis have been made. There is an unusual demand right now in view of the fact that no anthracite is coming West. Local dealers have their tonnage restricted, and the circular to the consumer is $12.25. Southern and Eastern foundry continues to move in on contracts, and some little on open market at the prevailing Eastern and Southern prices. The demand is unusually good.

Birmingham—Coke continues in good demand with spot foundry quoted at from $12.50 to $15 per net ton ovens. There is practically no contract business, as no single producer has enough free coke now. Furnace coke is reported as bringing from $7 to $8 per net ton ovens, only a few cars being available from time to time.

Middle Western

GENERAL REVIEW

Prices unchanged. Car shortage becoming more acute.

The market is stronger due to the fact that steam consumption seems to be as brisk, if not more so, than during the winter, orders for domestic coal coming in at a rapid rate and the car shortage steadily growing worse, with no prospect of any improvement. The continued cool weather, has also caused an unusual demand by householders, the result being the dealers are not putting as much coal in stock as they would like.

Dealers in Chicago and vicinity report an unusual demand for anthracite that they are unable to satisfy. The prices being made are for April delivery only. There is no anthracite at the head of the Lakes, and the outlook is far from encouraging. The poor car supply is delaying the movement of all-rail shipments, and all orders are being taken at "price in effect date of shipment."

The Indiana and Illinois mines have probably worked a little better than half time the past week, due to shortage of railway equipment. The docks continue to place orders with the Indiana and Illinois mines for prompt shipment, and from present outlook this will continue throughout the summer.

The mines in the mid-west continue to lose men, some securing steadier employment in other lines of work at higher wages than the union scale affords, and quite a number enlisting in the army and navy. With a better car supply, furnishing steadier employment there is no doubt but that fewer men would leave for other lines of work. The adoption of a new wage scale, giving the men a larger return, will have a tendency to hold the roving class, but this will not help the production much unless the men will work harder than heretofore.

CHICAGO

Current price ruling in Chicago market.

Business booked the past week was practically all taken at current prices. Cool weather with a big demand on the dealers created a steady flow of orders to the mines for prompt shipment. Chicago is buying great quantities of southern Illinois coal, and the dealers have not as yet been able to put much in stock.

Prices are very firm on Franklin County, especially on the major sizes. The percentage of time worked this week in Franklin County was about sixty; car shortage being responsible for the loss. Williamson County mines are maintaining the same prices as in Franklin County.

The tonnage in Saline County is practically sold up. Free coal is being offered at a premium over the circular issued of two weeks ago. Sangamon County, or the Springfield District, shows a steadier demand. Prices will probably advance next week.

Fulton and Peoria Counties report business picking up, especially for domestic sizes.

Indiana mines are having more trouble with car supply than southern Illinois. Running time has not been more than fifty per cent., and most of the demand for shipment this month is coming from Indiana and Michigan.

Premium prices are being offered for smokeless coal. Prices have varied on account of the peculiar situation, but the prospects are that the higher prices will prevail due to fact that no large amount of this coal will reach this market this month. The same is true of the Kanawha district as Pocahontas, premium prices being offered and very little moving into this territory. Very little eastern Kentucky coal is coming to this market. There is car shortage, not as acute as several weeks ago, but prices are firm.

Quotations in the Chicago market are as follows, per net ton f.o.b. cars at mines:

	Springfield	Fulton & Peoria Cos.	Clinton & Sullivan Cos.	Green & Knox Cos.	Carterville
Domestic lump	$2.50@2.75	$2.50@2.75	$2.75@3.00	$2.50@2.75	$2.75@3.00
Steam lump	2.25@2.50	2.25@2.50	2.00@2.25	2.00@2.25	2.50@2.75
Egg	2.50@2.75	2.50@2.75	2.75@3.00	2.50@2.75	2.75@3.00
Nut	2.50@2.75	2.50@2.75	2.75@3.00	2.50@2.75	2.75@3.00
Mine-run	1.75@2.00	2.00@2.25	1.75@2.25	2.00@2.25	2.25@2.50
Screenings	1.75@2.00	2.00@2.25	1.75@2.00	1.75@2.00	2.25@2.75

	Williamson & Franklin Cos.	Saline & Harrisburg	Poca. & W. Va. Smokeless	Penna. Smokeless	Eastern Kentucky
Lump	$3.00@3.25	$3.00@3.25	$3.75@4.25	4.00@4.25	$3.50@4.50
Egg	3.00@3.25	3.00@3.25	3.75@4.25	4.00@4.25	3.50@4.50
Nut	3.00@3.25	3.00@3.25	.....	.....	3.50@4.50
No. 1 nut	3.00@3.25	3.00@3.25	.....	.....	.....
No. 2 nut	3.00@3.25	3.00@3.25	.....	.....	.....
No. 3 nut	2.75@3.00	2.75@3.00	.....	.....	.....
No. 1 washed	3.00@3.25	.....	.....	.....	.....
No. 2 washed	3.00@3.25	.....	.....	.....	.....
Mine-run	2.50@3.00	2.50@3.00	3.50@4.00	4.00@4.25	3.00@4.00
Screenings	2.50@2.75	2.50@2.75	.....	4.00@4.25	.....

Hocking Lump $3.50@3.75. Splint Lump $3.50@3.75.

Northern Illinois (Grundy, LaSalle, Bureau and Will Counties):

Lump-egg	$3.00@3.25
Mine-run	2.75@3.00
Screenings	1.75@2.00
Screenings (washed)	2.25@2.50
Nut (washed)	3.00@3.25

MILWAUKEE

Announcement of new prices delayed. Uncertainty as to supplies Contract for 2000 tons of Youghiogheny screenings at $6.75.

No schedule of prices on coal for 1917 will be formulated until some time in May, or after navigation to and from the lower Lakes is resumed. This has not been officially announced, but it is tacitly accepted because of the situation. Coal stocks are at a very low ebb and what is left is being doled out to supply immediate needs. Orders for the future are predicated on the opening of navigation.

The city was forced to secure coal for its water-works plant and advertised for 3000 tons of Youghiogheny screenings or 2000 tons of this grade and 1000 tons of Pocahontas screenings. The successful bidder asked $6.75 for Youghiogheny screenings. No Pocahontas screenings were offered. Youghiogheny pile-run was offered at $7. Dealers refuse even to predict anything in the way of future rates. They want to find out how supplies are coming, and at what prices, before venturing to commit themselves.

We are as far off from the opening of navigation as we were a week ago. The nights are still cold enough in the vicinity of the Straits of Mackinac to make up for what little thawing the ice undergoes during the day time. Only a week of real mild weather, accompanied by warm rain and followed closely by a southerly gale, will do the business.

KANSAS CITY

Stringency in coal supplies continues despite warm weather and the presumed decrease in demand. Open prices remain steady, but contract prices have advanced 25c. on all grades. The car shortage has again become a factor, but efforts to get cars back into coal transportation have not been successful. The resumption of operations in the Missouri mines apparently has had no effect on the prices, and the shutdown was not responsible for the advance.

It is hard to gather all the factors that have caused the advances. The enormous demand from Chicago and Minneapolis is the chief immediate cause. The advances in all commodities is another indirect cause, it is said.

ST. LOUIS

Increasing car shortage has created a speculative market. Coal is in urgent demand and prices continue to rise. Heavy shipments to Chicago. Failure to get promises on shipments of Eastern coal strengthens market.

With slightly cooler weather, which has brought about some demand for domestic coal, the market is truly a speculative one and is very active. Country, steam and domestic demand together with some call for early storage tonnage has steadied the market and put it in a position where prices are advancing. Many operators in the Williamson and Franklin County field are sold up at the circular price of $3 for this month on domestic sizes and are behind on shipments on steam coal at the circular.

There has been a car shortage on practically all roads and this has permitted the majority of mines to work less than fifty per cent. of the time. Restrictions on some roads continue and cheap prices prevail only where restricted equipment moves.

There is very little contracting right now. Operators feel that they have taken about all they care to and refuse to quote except in isolated cases, and price quoted is so high that the consumer usually refuses, anticipating lower prices when warmer weather comes. There is nothing to indicate that any great tonnage will be contracted from this time on.

Three additional mines at Harrisburg have signed up contracts for their entire output to the Big Four R.R. for mine-run coal until Apr. 1, 1918. They are the O'Gara mine No. 12 here, the Wasson mine No. 2 at Carrier Mills, and the Harco mine.

The railroad demand has left very little coal for the open market, and the fact that the trade in this section is waking up to the problem of a future supply is evident in the demand for storage coal, which has taken such open market coal as was offered.

In the Mt. Olive field there has been very little free coal. Most of it is moving to the north at good prices, and cars are more plentiful in this field than in the others.

In the Standard field local demand is good, and a large tonnage is continually moving to Chicago at better prices than prevail here.

The prevailing market price f.o.b. mine for St. Louis is about 25c. under the country price, which is practically the circular. The low price in St. Louis is on restricted equipment only and is:

	Williamson and Franklin Co.	Mt. Olive and Staunton	Standard
6-in. lump	$2.50@3.00	$1.75	$1.50@1.75
3x6-in. egg	2.50@3.00	1.75	1.50@1.75
2x3-in. nut	2.50@3.00	1.75	1.50@1.75
No. 2 nut	2.50@3.00	.....	1.50@1.75
No. 3 nut	2.75@3.00	.....	.....
No. 4 nut	2.75@3.00	.....	.....
No. 5 nut	2.00@2.25	.....	.....
2-in. screen.	2.00@2.25	1.75@2.00	1.35@1.50
2-in. lump	.....	.....	1.35@1.50
3-in. lump	.....	1.75	.....
Steam egg	2.50@3.00	1.75	1.35@1.50
Mine run	2.00@2.25	1.75	1.35@1.40
Washed			
No. 1	3.25		
No. 2	3.00		
No. 3	2.75@3.00	None offered	None offered
No. 4	2.75@3.00		
No. 5	2.00@2.25		

Rate on Williamson and Franklin Co. is 72½c.; rate on other fields is 57½c.

General Statistics

RAILROAD MOVEMENT

The following statement of carloads of bituminous coal that originated on 55 railroads and of beehive coke on 10 roads in March, 1917, is compiled from reports received by the Geological Survey, Department of the Interior, by noon, Apr. 16, 1917.

	1917 March	1917 February	1916 March
No. of working days	27	23	27
Carloads of bituminous coal Pennsylvania (13 roads)	191,142	148,290	185,307
W. Va., Va., Md., and Ohio (9 roads)	148,557	123,209	137,985
Ill., Ind., and Mich. (16 roads)	152,389	144,995	131,435
Ky., Ala., Iowa, and Southwest. (11 roads)	25,445	25,321	24,028
Rocky Mont. States (6 roads)	13,547	13,979	9,548
55 roads	531,080	455,794	488,303
Carloads of beehive coke (10 roads)	68,125	50,354	75,689

The increase in shipments of bituminous coal in March, 1917, compared with February, 1917, was 16.5 per cent., and compared with March, 1916, was 8.8 per cent. The average number of cars of coal per working day was 19,669 in March, 1917, against 19,817 in February, 1917, and 18,085 in March, 1916. The increase in March over February, 1917, was due to the greater number of working days. On all the groups of roads shown more cars of coal were loaded in March, 1917, than in March, 1916, which had the same number of working days. An improvement in the car supply in the East is indicated by the increase of 6 per cent. in the average daily loading on 22 roads in Pennsylvania, West Virginia, Virginia, Maryland and Ohio, in March over February. The average daily loading on 16 roads in Illinois, Indiana and Michigan decreased 10 per cent. and on 17 other roads 15 per cent.

MOVEMENT OF COAL AND COKE

The movement of coal and coke over 13 leading Eastern railroads during January, 1916 and 1917, follows in short tons:

Classes and Railroads For Revenue Only	1916	1917
Anthracite:		
Baltimore & Ohio	.....	.....
Buffalo, Roch. & Pitts.	17,179	18,713
Buffalo & Susquehanna	887	829
Chesapeake & Ohio	1,284	718
Erie	859,718	849,977
Huntingdon & B. T. Mnt.	38	124
Pennsylvania	1,136,878	982,249
Pittsburgh & Lake Erie	30	15
Pitts. Shaw. & Northern	2,003	1,841
Virginian	273	514
Western Maryland	34,788	43,371
Total	2,053,078	1,898,351
Bituminous:		
Baltimore & Ohio	.....	.....
Buffalo, Roch. & Pitts.	886,932	808,309
Buffalo & Susquehanna	152,661	127,730
Chesapeake & Ohio	2,242,187	2,140,516
Erie	806,243	727,335
Huntingdon & B. T. Mnt.	113,314	134,372
N. Y. Cent. (Buffalo and E.)	730,769	773,310
Norfolk & Western	2,365,408	2,490,388
Pennsylvania	4,314,806	4,259,039
Pittsburgh & Lake Erie	980,247	923,971
Pittsburgh, Shaw. & No.	232,736	170,813
Virginian	445,219	572,190
Western Maryland	714,036	845,579
Total	13,984,558	13,973,552

Foreign Markets

GREAT BRITAIN

Mar. 22—There has been an improvement in the tonnage position and this has had the effect of steadying the market generally, although for spot positions, coal may still be had at a discount on quoted prices.

The market is now quotable as follows:

Best Welsh steam	Nominal
Best seconds	Nominal
Seconds	$6.00@6.24
Best dry coals	5.76@6.00
Best Monmouthshires	6.00@6.24
Seconds	5.52@5.76
Best Cardiff smalls	4.08@4.32
Cargo smalls	3.60@3.84

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport, both net, exclusive of wharfage.

Freights—There has been a slight improvement in the quantity of tonnage offering, probably induced by the higher rates conceded in certain directions. There is still, however, a lot of room for improvement in the tonnage supply.

Gibraltar	$19.20	Port Said	$26.40
Marseilles	21.00	Las Palmas	16.80
Genoa	24.30	St. Vincent	18.00
Naples	23.58	River Plate	19.20
Alexandria	27.00		

Financial Department

Delaware, Lackawanna & Western R.R.

The following comments concerning the coal industry have been excerpted from the annual report of this company for the year ended Dec. 31, 1916:

Earnings—The railroads have all been severely taxed to perform the transportation service required in handling the business of the country, and their earnings have been larger than in any previous year. This company has enjoyed its share of the prevailing prosperity; its gross earnings aggregated $51,580,899, or $6,794,168 over 1915, an increase of 15.17%.

The earnings from the transportation of coal increased $1,111,237, notwithstanding the rates of freight on anthracite coal from the mines to many points were reduced by order of the I S. C. Commission, effective April 1, 1916.

The war conditions in Europe and the demands on this country for foodstuffs and munitions of war of all kinds have constituted the chief cause for this increase in freight traffic, and present indications are that this condition is likely to continue throughout the coming year.

Operating Expenses—The increase in cost of maintenance and operations was $4,184,027, or 15.07%, a slightly less percentage than the increase in gross earnings, i.e., 15.17%. There developed an unusual shortage of labor of all kinds, due to the requirements and high wages paid by munition and machine shops. Numerous strikes and suspensions of work resulted, following demands for increased wages, which, in many cases, had to be granted. Materials and supplies oftentimes could be procured only at abnormally high prices, frequently as much as double those in recent years.

Coal Mining Department—The tonnage produced from our collieries and washeries was larger than in any previous year, aggregating 9,428,462 tons, an increase of 663,205 tons over 1915.

The wage agreement with the anthracite mine employees expiring on Mar. 31, 1916, a new agreement was reached for four years from Apr. 1, under which wages were advanced and the hours reduced from nine to eight per day. To cover our liability under the Penna. Workmen's Compensation Act, a reserve was established and $250,000 was charged to cost of mining and credited thereto.

Mining improvements amounted to $659,051. The development of the new Loomis colliery was completed about the middle of the year (the cost for 1916 being $344,837) and has been in successful operation since.

The contract for the sale of the company's output of coal to the D., L. & W. Coal Co. was amended, as to prices paid by it for coal delivered f.o.b. cars at the mines, same being readjusted to cover the additional cost of coal under the new wage schedule, also for higher taxes, increase in cost of materials used in mines, including powder and other explosives, and increased payments for injuries to employees, as explained above.

Outlook—There was some slowing down of business in certain lines during the closing months of the year, which, coupled with the more recent developments and complications growing out of the war in Europe, that may possibly involve this country therein, has somewhat reduced the business and earnings of the railways generally. They have not, however, been able to make relative reductions in their operating expenses. There is still a great scarcity of labor of nearly all classes, especially "unskilled." At the present writing business continues on a large scale, with all the equipment and other railway facilities of the country fully employed.

Elkhorn Piney Coal Mining Co.

In connection with a sale of bonds by this company the following statement has been issued:

The company has outstanding $1,800,000 capital stock, paid for at par in cash, of which 75 per cent. is owned by the Milwaukee Coke and Gas Co. and 25 per cent. by the Northwestern Iron Co. The company's total of other liabilities is less than $35,000.

Security—Direct first mortgage lien upon the entire property, representing a present cash investment of about $3,255,000, and which includes about 2750 acres of coal lands owned in fee and the coal and mineral contained in about 1680 acres additional, in Raleigh County, W. Va., and a leasehold interest for 25 years from 1913, with right of renewal for a further 25 years, in about 4825 acres of coal lands in one tract in Floyd and Pike Counties, Ky., together with equipment. Coal content (high-grade bituminous) of property owned is estimated at over 64,900,000 tons, and of leased property at nearly 80,000,000 tons.

Contracts, in effect for 15 years from 1917, provide that the Milwaukee company purchase 75 per cent. of the entire output and the Northwestern Iron Co. the remaining 25 per cent., with the following minimum annual tonnage and profits to the company over cost of production and principal and interest payments:

Year	Minimum Tonnage	Profit per Ton	Minimum Ann. Prof.
1917.....	400,000	$1.00	$400,000
1918.....	1,000,000	.35	350,000
1919–1931...	1,600,000	.35	560,000

The Milwaukee company has in operation about 160 coke ovens with a daily capacity of about 1750 tons of coke and 8,000,000 ft. of gas. The Northwestern Iron Co. owns and operates a pig-iron plant with an annual capacity of about 240,000 tons. Raw materials are obtained from its iron ore reserve with estimated contents of from 12,000,000 to 16,000,000 tons and from byproduct coke ovens with a coking capacity of 1000 tons of coal daily.

Additional Bonds—Prior to Feb. 1, 1918, not over $500,000 additional bonds are issuable for 60 per cent., at par, of the cost of additional coal lands or coal land leaseholds, and thereafter reserved bonds may be issued only for 60 per cent., at par, of the cost of additions, etc., when net earnings are 120 per cent. of succeeding year's interest and maturing principal of all bonds outstanding and then to be issued.

Pocahontas C. & C. Co.

The annual report of the Norfolk & Western Ry. for the year ended Dec. 31, 1916, comments on the operations of the Pocahontas Coal and Coke Co., its subsidiary, as follows:

Under the sinking fund provision of the Pocahontas Coal & Coke Co. Purchase Money First Mortgage dated Dec. 2, 1901, the sum of $339,344.43 accrued from royalties on coal mined during the calendar year 1916, which sum will be applied early in 1917 to the purchase of bonds. From the beginning of the operation of the sinking fund in 1906 to date, the accruals from royalties on coal mined have aggregated $2,454,920.08 and those from sales of lands $134,771.22, a total of $2,680,691.30 applicable to the purchase and retirement of mortgage bonds.

From the surplus earnings of the year 1916 further payments aggregating $99,000 have been made on account of indebtness incurred in previous years to meet fixed charges.

The consolidation of the company's properties through purchases of interior tracts and exchanges of lands with other companies, and the work of completing titles, surveying, monumenting and mapping continue.

The railway company's report also contains the following interesting information concerning operations along its lines:

At the close of the year there were 144 companies organized for producing coal and coke on your company's lines, with a total of 248 separate mines, of which 245 were in actual operation.

Of the 13,931 coke ovens, 5335 were in blast.

Consumers Co. (Chicago)

This company reports in part for the year ended Dec. 31, 1916, as follows:

The payment of the eighth semiannual dividend marks the close of the fourth year of the company. With this dividend we have returned to our stockholders $1,105,664, and in addition have carried to surplus, applicable to the common stock, $502,182.

During the year we have retired $50,000 debentures in addition to increasing our sinking fund $79,000 covering our first thousand bonds. We have expended for repairs, renewals, depreciation and reserves, $677,046.

We have replaced a lot of horses, worn out by last year's heat and strain, by the purchase of 36 trucks (5 gasoline and 25 electrics), also exchanged five of the old Mack trucks for new ones.

There has been a very unusual situation in the coal business in the last three months of 1916. Very substantial profits could have been made in the coal end of our business had we taken advantage of the situation. We thought it better business policy to furnish our customers, in addition to their full percentage of that covered by contract, coal at actual cost plus our regular margin, instead of an excessive and unusual profit.

INCOME ACCOUNT FOR YEARS ENDING DEC. 31

	1916	1915
Gross profit from sales.....	$3,897,944	$3,298,522
Teaming, etc., cost.....	1,271,804	1,104,823
Operating and adm, expenses	1,127,687	1,027,330
Net profits.....	$1,498,452	$1,166,369
*Repairs, depreciation, etc...	$677,046	$491,206
Advertising.....	104,106	50,887
Interest K. I. bonds.....	199,488	203,750
do serial debentures....	81,500	84,500
do loans.....	23,465	31,526
Preferred dividends.....	276,416	276,416
Total deductions.....	$1,362,021	$1,138,285
Balance, surplus.....	$136,431	$28,084

* Includes amounts expended for repairs and for depreciation of horses and motor trucks and reserves for coal inventory adjusts. and ice shrinkage.

BALANCE SHEET DEC. 31

Assets	1916	1915
Land, buildings, leaseholds, etc.....	*$12,724,034	$12,776,860
Goodwill.....	2,500,000	2,500,000
K.I. 1st M. in treas.....	200,000	200,000
Sk. fd. (K.I. 1st M).....	350,154	269,279
Investments.....	22,608	21,158
Cash.....	448,709	388,031
Notes receivable.....	140,891	193,488
Accounts receivable less reserve.....	2,331,376	1,948,197
Inventories.....	1,917,181	1,606,557
Discount on debenture bonds.....	111,667	121,667
Miscellaneous.....	72,474	97,804
Total.....	$20,819,093	$20,123,041

Liabilities	1916	1915
Preferred stock.....	$3,948,800	$3,948,800
Common stock.....	6,000,000	6,000,000
Funded debt.....	5,850,000	5,900,000
Real estate purch. def. notes.....	94,450	93,200
Notes payable.....	1,316,655	1,465,055
Accounts payable.....	2,063,018	1,274,043
Accrued int. (K. I. first mtge.).....	114,575	112,725
Other accr. int., etc.....	100,361	107,867
Pref. div. Aug. 20 to Dec. 31.....	99,817	99,817
Mdse. coupons.....	53,597	38,466
Reserves.....	675,638	[illegible]
Surplus.....	502,182	[illegible]
Total.....	$20,819,093	$20,[illegible]

* Includes in 1916: land, $4,259,497; buildings, $4,283,343; leaseholds, $394,329; water rights and ice-cutting privileges, $988,000; machinery, equipment and tools, $1,611,027; railroad tracks and cars, $393,342; horses, wagons, harness, auto trucks and automobiles, $794,497.

Wayne Coal Co.—In connection with a recent bond issue this company has made the following statement: The bonds are dated Mar. 1, 1917. Due Mar. 1, 1937. Sinking fund from Mar. 1, 1917, 10c. per ton of run-of-mine coal mined, to retire bonds.

The company, incorporated in Delaware in January, 1917, as of Feb. 27, was producing about 1000 tons of coal daily and owned or had under option about 30,000 acres of coal lands in Harrison, Jefferson and other counties in Ohio; part already accepted by the trustee as security. Before Mar. 31, 1917, a total of about 9000 acres were tested and approved.

By the end of April, 1917, four complete units should be in operation, capable of producing 4000 tons of coal per day, which at $4.50 per ton, would show earnings for the first year's operation as follows: 960,000 tons at $4.50 per ton, $4,320,000; net earnings, $3,878,400. Deduct interest on $3,000,000 bonds, $180,000; sinking fund, $96,000, and dividends of 8% on $6,000,000 stock, $480,000.